# CSCI 1380

FEBRUARY 22, 2017

A program can execute sequentially, ***conditionally***, and/or ***iteratively***.

# SEQUENTIAL EXECUTION

```cpp
#include <iostream>
using namespace std;

int main()
{
    string s;
    cout << “Hello! What is your name?\n”;
    cin >> s;
    cout << “Nice to meet you ” << s << “!”;
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
Hello! What is your name?
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
Hello! What is your name?
Professor
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string s;
7      cout << “Hello! What is your name?\n”;
8      cin >> s;
9      cout << “Nice to meet you ” << s << “!”;
10 }
```

```
Hello! What is your name?
Professor
Nice to meet you Professor!
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    cout << “You entered: ” << score << “.”;
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
What is your score?
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      float score;
7      cout << “What is your score?\n”;
8      cin >> score;
9      cout << “You entered: ” << score << “.”;
10 }
```

```
What is your score?
91.8
```

```cpp
#include <iostream>
using namespace std;


int main()
{
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    cout << “You entered: ” << score << “.”;
}
```

```
What is your score?
91.8
You entered: 91.8.
```

# CONDITIONAL EXECUTION

# `if`

The computer executes a **code block** *if* the specified conditions (a **logical expression**) are met.

# EXAMPLE:
# A SIMPLE POINT-TO-GRADE CONVERTER
# (pass/fail)

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

# IF STATEMENT

```
1   #include <iostream>
2   using namespace std;
3
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      cout << “You: ” << grade << “.”;
15  }
```

# LOGICAL EXPRESSION

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

# CODE BLOCK

```
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
if (score >= 60) {…}
```

(Translation: “If the score is greater than or equal to 60, then…”)

```
if (score >= 60) {…}
```

(Translation: “If the score is greater than or equal to 60, then…”)

```
if (score >= 60) {…}
```

(Translation: “If the score is greater than or equal to 60, then…”)

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

# EXECUTION ON INPUT OF 64.2

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
What is your score?
64.2
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
What is your score?
64.2
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
64.2
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
64.2
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
64.2
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
What is your score?
64.2
You: pass.
```

# EXECUTION ON INPUT OF 59.9

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
What is your score?
59.9
```

```cpp
#include <iostream>
using namespace std;

int main()
{
    string grade;
    float score;
    cout << “What is your score?\n”;
    cin >> score;
    if (score >= 60)
    {
        grade = “pass”;
    }
    cout << “You: ” << grade << “.”;
}
```

```
What is your score?
59.9
You: .
```

```
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     cout << “You: ” << grade << “.”;
15 }
```

```
What is your score?
59.9
You: .
```

# `if-else`

The computer executes a particular code block *if* the specified conditions are met. *Otherwise*, the computer executes a different code block.

# EXAMPLE:
# UPDATED POINT-TO-GRADE CONVERTER
# (pass/fail)

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
16      }
17      cout << “You: ” << grade << “.”;
18  }
```

# IF STATEMENT

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
16      }
17      cout << “You: ” << grade << “.”;
18  }
```

# LOGICAL EXPRESSION

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
16      }
17      cout << “You: ” << grade << “.”;
18  }
```

# CODE BLOCK

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
16      }
17      cout << “You: ” << grade << “.”;
18  }
```

# CODE BLOCK

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else // score < 60
15      {
16          grade = “fail”;
16      }
17      cout << “You: ” << grade << “.”;
18  }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

# EXECUTION ON INPUT OF 95.7

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
95.7
You: pass.
```

# EXECUTION ON INPUT OF 33.3

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
4  int main()
5  {
6      string grade;
7      float score;
8      cout << “What is your score?\n”;
9      cin >> score;
10     if (score >= 60)
11     {
12         grade = “pass”;
13     }
14     else
15     {
16         grade = “fail”;
17     }
18     cout << “You: ” << grade << “.”;
19 }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
```

```
4   int main()
5   {
6       string grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 60)
11      {
12          grade = “pass”;
13      }
14      else
15      {
16          grade = “fail”;
17      }
18      cout << “You: ” << grade << “.”;
19  }
```

```
What is your score?
33.3
You: fail.
```

# if-else if-else

# EXAMPLE:
# POINT-TO-GRADE CONVERTER (A-C)

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

# EXECUTION ON INPUT OF 82.9

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
82.9
```

# EXECUTION ON INPUT OF 45.1

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
45.1
```

# EXECUTION ON INPUT OF 98.7

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

```
6       char grade;
7       float score;
8       cout << “What is your score?\n”;
9       cin >> score;
10      if (score >= 90)
11      {
12          grade = ‘A’;
13      }
14      else if (score >= 80)
15      {
16          grade = ‘B’;
17      }
18      else
19      {
20          grade = ‘C’;
21      }
22      cout << “You earned a: ” << grade;
```

```
What is your score?
98.7
```

# GENERAL STRUCTURE & FLOW

# ONE-WAY CONDITIONAL EXECUTION

```
if (logical expression) {…}
```

```
if (evaluate logical expression) {…}
```

```
if (evaluates to true) {…}
```

```
if (evaluates to false) {…}
```

# TWO-WAY CONDITIONAL EXECUTION

```
if (logical expression) {…}
else {…}
```

```
if (evaluate logical expression) {…}
else {…}
```

```
if (evaluates to true) {…}
else {…}
```

```
if (evaluates to false) {…}
else {…}
```

# THREE-WAY CONDITIONAL EXECUTION

```
if (logical expression #1) {…}
else if (logical expression #2) {…}
else {…}
```

```
if (evaluate logical expression #1) {…}
else if (logical expression #2) {…}
else {…}
```

```
if (evaluates to true) {…}
else if (logical expression #2) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluate logical expression #2) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to true) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to false) {…}
else {…}
```

# MULTI-WAY CONDITIONAL EXECUTION

```
if (logical expression #1) {…}
else if (logical expression #2) {…}
…
else if (logical expression #n) {…}
else {…}
```

```
if (evaluate logical expression #1) {…}
else if (logical expression #2) {…}
…
else if (logical expression #n) {…}
else {…}
```

```
if (evaluates to true) {…}
else if (logical expression #2) {…}
…
else if (logical expression #n) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluate logical expression #2) {…}
…
else if (logical expression #n) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to true) {…}
…
else if (logical expression #n) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to false) {…}
…
else if (evaluate logical expression #n) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to false) {…}
…
else if (evaluates true) {…}
else {…}
```

```
if (evaluates to false) {…}
else if (evaluates to false) {…}
…
else if (evaluates to false) {…}
else {…}
```