Programming Review

Simple C++ Program

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

int main()
{
    //Note
    cout << “Hello World” << endl;

    return 0;
}
```

Variables

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

int main()
{
    double gpa;
    gpa = 4.0;

    //Note
    cout << “GPA: ” << gpa << “\n”;

    return 0;
}
```

Formatting

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

int main()
{
    double gpa;
    gpa = 4.0;

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << “GPA: ” << gpa << “\n”;

    return 0;
}
```

Conditionals

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

int main()
{
    double gpa;
    gpa = 4.0;

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is "

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    return 0;
}
```

Control Structures

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

int main()
{
    int times;
    double gpa;

    times = 3;
    gpa = 4.0;

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

Functions

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

int main()
{
    int times;
    double gpa;

    times = 3;
    gpa = calculateGPA();

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

```
double calculateGPA()
{
    return 4.0;
}
```

Function Overloading

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

int main()
{
    int times;
    double gpa;

    times = 3;
    gpa = calculateGPA();

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

```
double calculateGPA()
{
    return 4.0;
}

double calculateGPA(double g1)
{
    return g1;
}

double calculateGPA(double g1, double g2)
{
    return (g1 + g2) / 2.0;
}
```

Default Function Parameters

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

int main()
{
    int times;
    double gpa;

    times = 3;
    gpa = calculateGPA();

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

```
double calculateGPA(double g1 = 4.0)
{
    return g1;
}

double calculateGPA(double g1, double g2)
{
    return (g1 + g2) / 2.0;
}
```

Pass By Reference

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

int main()
{
    int times;
    double gpa;

    gpa = calculateGPA(&times);

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

```
double calculateGPA(int& times, double g1 = 4.0)
{
    times = 1;
    return g1;
}

double calculateGPA(int times, double g1, double g2)
{
    times = 2;
    return (g1 + g2) / 2;
}
```

Random Number Generation

```
#include <iostream>
#include <iomanip>
#include <cstdlib>
#include <ctime>
using namespace std;

int main()
{
    int times;
    double gpa;

    srand(time(0));
    gpa = calculateGPA(&times);

    //Note
    cout << fixed << showpoint << setprecision(2);
    cout << "GPA: " << gpa << "\n";
    cout << "Letter Grade is ";

    if (gpa >3.67)
        cout << "an A";
    else
        cout << "not A";

    for (int i = 0; i < times; i++)
        cout << "!";

    return 0;
}
```

```
double calculateGPA(int& times, double g1 = 4.0)
{
    times = rand() % 10;
    return g1;
}

double calculateGPA(int times, double g1, double g2)
{
    times = (rand() % 10) + 1;
    return (g1 + g2) / 2;
}
```

File I/O

```
#include <iostream>
#include <iomanip>
#include <cstdlib>
#include <ctime>
#include <fstream>
using namespace std;

int main()
{
    int times;
    double gpa;
    ofstream output;

    srand(time(0));
    gpa = calculateGPA(&times);
    output.open("gpa.txt");

    //Note
    output << fixed << showpoint << setprecision(2);
    output << "GPA: " << gpa << "\n";
    output << "Letter Grade is ";

    if (gpa >3.67)
        output << "an A";
    else
        output << "not A";

    for (int i = 0; i < times; i++)
        output << "!";

    output.close();
    return 0;
}
```

```
double calculateGPA(int& times, double g1 = 4.0)
{
    times = rand() % 10;
    return g1;
}

double calculateGPA(int times, double g1, double g2)
{
    times = (rand() % 10) + 1;
    return (g1 + g2) / 2;
}
```

Arrays

```
#include <iostream>
#include <iomanip>
#include <cstdlib>
#include <ctime>
#include <fstream>
using namespace std;

int main()
{
    int times;
    double gpa;
    ofstream output;

    srand(time(0));
    gpa = calculateGPA(&times);
    output.open("gpa.txt");

    //Note
    output << fixed << showpoint << setprecision(2);
    output << "GPA: " << gpa << "\n";
    output << "Letter Grade is ";

    if (gpa >3.67)
        output << "an A";
    else
        output << "not A";

    for (int i = 0; i < times; i++)
        output << "!";

    output.close();
    return 0;
}
```

```
double calculateGPA(int& times, double g1 = 4.0)
{
    times = rand() % 10;
    return g1;
}

double calculateGPA(int times, double g1, double g2)
{
    times = (rand() % 10) + 1;
    return (g1 + g2) / 2;
}
```

```
double calculateGPA(double grades[], int number)
{
    double ret = 0.0;
    for (int i = 0; i < number; i++)
        ret += grades[i];
    ret /= number;
    return ret;
}
```

Pointers and Memory Allocation

```
#include <iostream>
#include <iomanip>
#include <cstdlib>
#include <ctime>
#include <fstream>
using namespace std;

int main()
{
    int *times;
    double gpa;
    ofstream output;

    srand(time(0));
    times = new int;
    gpa = calculateGPA(times);
    output.open("gpa.txt");

    //Note
    output << fixed << showpoint << setprecision(2);
    output << "GPA: " << gpa << "\n";
    output << "Letter Grade is ";

    if (gpa >3.67)
        output << "an A";
    else
        output << "not A";

    for (int i = 0; i < *times; i++)
        output << "!";

    output.close();
    delete times;
    return 0;
}
```

```
double calculateGPA(int* times, double g1 = 4.0)
{
    *times = rand() % 10;
    return g1;
}

double calculateGPA(int times, double g1, double g2)
{
    times = (rand() % 10) + 1;
    return (g1 + g2) / 2;
}
```

```
double calculateGPA(double grades[], int number)
{
    double ret = 0.0;
    for (int i = 0; i < number; i++)
        ret += grades[i];
    ret /= number;
    return ret;
}
```

Need More?

- Professor Myers' COP3014 lecture notes:
  - http://www.cs.fsu.edu/~myers/c++/notes/index3014.html