16.216: ECE Application Programming

Summer 2012

Lecture 2: Key Questions
July 12, 2012

1. **Example:** What values do w, x, y, and z have at the end of this program?

```
int main() {
    int w = 5;
    float x;
    double y;
    char z = 'a';
    x = 8.579;
    y = -0.2;
    w = x;
    y = y + 3;
    z = w – 5;
    return 0;
}
```

2. Describe the use of `printf()` to print numeric values and characters.

3. **Example:** Show the output of each of the following short programs:

a.

```
#include <stdio.h>
void main()
{
     int i=2, j=3, k, m;
     k = j * i;
     m = i + j;
     printf("%d %d %d %d\n", i, j, k, m);
}
```

b.

```
#include <stdio.h>
void main() {
     double f, g;
     f = 1.0 / 4.0;
     g = f * 20;
     printf("f = %lf,\ng = %lf\n", f, g);
}
```

c.

```
#include <stdio.h>
void main(){
    int a = 5, b = 2;
    printf("Output%doesn't%dmake%dsense", a, b, a + b);
}
```

4. Describe the use of `scanf()` for reading input values into variables.

5. How does `scanf()` handle whitespace and other characters in format string?

6. **Example:** Assume you have the following variables: `int i; double d; char c;` If your program contained each of the following calls to scanf(), what values would be read into the appropriate variables, given user input?

a. Input: `34 5.7`
```
scanf("%d%lf", &i, &d)
```

b. Input: `34 5.7`
```
scanf("%d       %lf", &i, &d)
```

c. Input: `34 5.7`
```
scanf("%lf%d", &d, &i)
```

d. Input: `34 5.7`
```
scanf("%d%c", &i, &c)
```

e. Input: `34 5.7`
```
scanf("%d %c", &i, &c)
```

f. Input: `34 5.7`
```
scanf("%d-%c", &i, &c)
```

g. Input: `34-5.7`
```
scanf("%d-%c", &i, &c)
```

7. Describe the basic elements of a flowchart.

8. Design a flowchart to solve the following:
   - Prompt a user to enter four numbers on a single line, which represent the contents of a 2x2 array
   - After reading the values, your program should print the matrix represented by these values
     - For example, if the user enters “1 2 3 4”, print:
       ```
       1  2
       3  4
       ```
     - Assume all values have the same number of digits
   - Also, calculate the matrix discriminant and print it on a separate line
     - In the example above, discriminant = (1x4) - (2x3) = 4-6 = -2

9. Convert the flowchart you wrote into a C program.

10. Explain the useful features of a debugger.
Note: At this point, we'll run through the use of the Visual Studio debugger; feel free to use this space to take notes on that demonstration.