16.216: ECE Application Programming

Fall 2011

Lecture 21: Key Questions
October 26, 2011

1. **Example:** What does the following program print?

```
#include <stdio.h>

int f(int a, int b);                // Function prototype

int main() {
      int x = 1;
      int y = 2;
      int result1, result2, result3;

      result1 = f(x, y);
      result2 = f(y, result1);
      result3 = f(result1, result2);

      printf("x = %d, y = %d\n", x, y);
      printf("Result 1: %d\n", result1);
      printf("Result 2: %d\n", result2);
      printf("Result 3: %d\n", result3);

      return 0;
}

int f(int a, int b)           // Function definition
{
      int i;                  // Loop index
      int r = 0;              // Result

      for (i = 0; i < a; i++)
            r += b;

      return r;
}
```

2. **Example:** Write a function to do each of the following:

a. Prints a series of LINE_LENGTH dashes on a single line, where LINE_LENGTH is a predefined constant (using #define)

b. Reads a value from the console input and returns 1 if the value is even, 0 if it's odd

c. Takes four numbers as arguments and returns their average

3. Explain what a pointer is, and how we can use them in C.

4. Explain the use of passing function arguments by address.

5. **Example:** Show the final output of the program below:

```
#include <stdio.h>
#include <math.h>
void get_r_theta(double a, double b,
     double *adr_r, double *adr_th);

void main()
{
  double x,y,h,r,th;
  printf("Enter x, y components of vector: ");
  scanf("%lf %lf",&x,&y);
  get_r_theta(x,y,&r,&th);
  printf("Vector with x=%lf and y=%lf
       has r=%lf, theta=%lf\n",x,y,r,th);
}

void get_r_theta(double a, double b,
     double *adr_r, double *adr_th)
{
  double sum;
  sum = pow(a,2)+pow(b,2); //or a*a+b*b;
  *adr_r = sqrt(sum);
  *adr_th = atan2(y,x);
}
```