APS 105: Computer Fundamentals

Tutorial #3
Summer 2025

Problem 1: Pointer(Winter 2017 Midterm Exam, Q6)

Consider the following code, which uses pointers. What are the values of the variables a and b after this code is executed?

```
  int a, b, c, d;
  int *e, *f;

  a = 5;
  b = 6;
  e = &c;
  f = &d;
  *e = a + b;
  *f = *e + b;
  e = &a;
  f = &b;

  *e = c + d;
  *f = a + b;
```

Problem 2: Pointers and Functions (Winter 2018 Midterm, Q6)

The following function returns the higher value between c and d. Identify the potential error in the higher function and fix it.

```
#include <stdio.h>

int higher(int *m, int *n) {
    int isHigher;

    if (m >= n)
      isHigher = m;
    else
      isHigher = n;

    return &isHigher;
```

```c
    }

int main(void) {
    int c = 9, d = 8;
    int isHigher;

    isHigher = higher(&c, &d);
    printf("%d\n", isHigher);

    return 0;
  }
```

Problem 3: Conversion with Functions (Winter 2019 Midterm, Q9)

There are 0.3048 metres in a foot, 100 centimetres in a metre, and 12 inches in a foot. Write a program that will accept, as input, a length in feet and inches. You do not have to check for valid input – assume the user enters positive, non-fractional values for the feet and inches. The program will output the equivalent length in metres and centimetres (rounded to the nearest centimetre).

Your code should include four functions: one for input, one for output, one to perform the calculation, and main. The function prototypes are below. For full marks, your code should not use any global variables.

```c
void getInput(int *outFeet, int *outInches);
void printOutput(int feet, int inches, int metres, int centimetres);
void convert(int feet, int inches, int *outMetres, int *outCentimetres);
```

Problem 4: Print Pattern (Modified from Winter 2022 Midterm, Q3)

Write a complete C program that first prompts the user to enter the number of rows in a pattern, then prints a pattern were the first and last row and column is filled with stars and a diagonal in the square is drawn. The following are sample outputs when number of rows is 5 and 8:

```
Enter number of rows: 5
*****
*  **
* **
**  *
*****
```

```
Enter number of rows: 8
********
*      **
*    * *
*   *  *
*  *   *
* *    *
**     *
********
```