CSCU9V4 Practical 4: It's rude to point!

Introduction

Whole modules could be devoted to pointers and their underlying implementations. Though that may be a bit much for our purposes, time to get started!

Pen and Paper

Attempt the following **on your own first**, before consulting with others.

1. If `i` is a variable and `p` points to `i`, which of the following expressions are aliases for `i`?

```
(a)  *p        (c)  *&p          (e)  *i         (g)  *&i
(b)  &p        (d)  &*p          (f)  &i         (h)  &*i
```

2. If `i` is an `int` and `p` and `q` are pointers to `int`, which of the following assignments are legal?

```
(a)  p = i;        (d)  p = &q;        (g)  p = *q;
(b)  *p = &i;      (e)  p = *&q;       (h)  *p = q;
(c)  &p = q;       (f)  p = q;         (i)  *p = *q;
```

Pen and Paper

Consider the following block of very simple code, that takes some amount in Sterling and breaks it down into the minimum number of bills and coins that total the amount given.

```
#include <stdio.h>

int main(void)
{
  int amount, twenties, tens, fives, ones, reduced_amount;

  printf("Enter a dollar amount: ");
  scanf("%d", &amount);

  twenties = amount / 20;
  reduced_amount = amount - (20 * twenties);

  tens = reduced_amount / 10;
  reduced_amount = reduced_amount - (10 * tens);

  fives = reduced_amount / 5;
  ones = reduced_amount - (5 * fives);

  printf("\n");   /* blank line */

  printf("$20 bills: %d\n", twenties);
  printf("$10 bills: %d\n", tens);
  printf(" $5 bills: %d\n", fives);
  printf(" $1 bills: %d\n", ones);

  return 0;
```

```
}
```

Task 1: Re-write the program to solve the problem using functions, and with the following constraints:

a. No calculation within the body of `main()`.
b. All output within the body of `main()`.
c. Do this **without pointers**.

This is *hard*. Avoid underestimating the complexity of the task. Pen and paper is a great start!

Could you have written less code, without sacrificing clarity?

Task 2: In a whole new project (in IDEs) or source file (in text editors), re-write the program to solve the problem with the following constraints:

a. No calculation within the body of `main()`.
b. All output within the body of `main()`.
c. Do this with at most one user-defined function call, i.e. excluding standard I/O functions.
