Problem 1
1 0110 010

Problem 2
swap_any(ptr1, ptr2 + 2, sizeof(int) * 3);
swap_any(&ptr1, &ptr2, sizeof(int*));

Problem 3
(a)
6
10 3
i 10 2
i + j
10

(b) Explanation should mention lea then add of lea result to itself. (Optional level of detail: lea works as a 3x, and add of result to itself is 3x + 3x = 6x.) Explanation should mention that imul is slow.

Problem 4
(a)
0
aaron  16
0  i--
0  (aaron*16) + 2
j  +=  3
burr  +=  (aaron  *  16)

(b) The shl is calculating a multiplication, because shl is faster than imul in hardware. The quantity (aaron * 16) is used in several places, so gcc does the multiplication once and then reuses the value throughout.
(c) The if has no effect because the function returns the length either way.
Problem 5
(a) \[ \text{twin}_a = \begin{array}{cccccccc}
0 & 1 & 1 & 1 & 0 & 0 & 1 & 0 \\
\end{array} \]

(b) \[ \text{twin}_b = \begin{array}{cccccccc}
0 & 1 & 0 & 1 & 1 & 0 & 0 & 1 \\
\end{array} \]

(c) \[ \text{twin}_a + \text{twin}_b = \begin{array}{cccccccc}
0 & 1 & 1 & 1 & 0 & 0 & 1 & 1 \\
\end{array} \]

Decimal: 176

Problem 6
int story(int raise, int *glass, char *freedom)
{
    if (freedom[0] == 'f') {
        *glass = raise;
    } else {
        *glass = 24;
    }

    int tonight = 0;

    for (int i = raise; i >= 0; i -= 2) {
        tonight += 76;
    }

    return tonight * 3;
}

int schuyler(int peggy)
{
    int angelica;
    int eliza = story(peggy, &angelica, "helpless");
    eliza *= 2;

    return eliza + peggy;
}