[**Open pink book only**] Show all of your work clearly in the space provided or on the additional pages at the end of the exam. If the additional pages are used, clearly identify to which exam question it is related. Be sure to **read each problem carefully**. You should answer all 4 questions, and you may wish to answer the bonus question if you have time. Note that the exam is double sided.

1. (11 points) Write a code segment so that the four lower bits of port C are used for output and the four upper bits are used for input.

2. (15 points) How do the `blo` and `ble` instructions differ? Give an example code fragment which compares two numbers such that:
- a branch will occur if `blo` follows the comparison
- a branch will **not** occur if `ble` follows the comparison

3. Write the assembly instruction(s) required to **pulse** `STRB`
    (a) (8 points) assuming that the 68HC11 is in simple strobe mode.

    (b) (8 points) assuming that the 68HC11 is in full input handshaking mode.

    (c) (8 points) assuming that the 68HC11 is in full output handshaking mode.

4. (50 points) Write an assembly subroutine for the following C prototype:

```
int func(int x, int y, int z);
```

The subroutine should return:

$$
\begin{array}{ll}
x + y + z & x > 0 \\
x - y - z & x < 0 \\
0 & otherwise
\end{array}
$$

Your subroutine should calculate the correct value (25 points) and be designed to correctly interface with the C calling function (25 points). Be sure to include any necessary assembler directives.

bonus (10 points) — all or nothing

Suppose that we wish to call the following C function from an assembly routine:

```
int func(int x, int y, int z);
```

Write the assembly code necessary to call func(3, 543, -7) and store the result in the memory location `0xF000:0xF001`.

Additional work area for any problem. Clearly identify to which problem the work on this page is related.

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