MC28 Intra-term Exam 1

Serial #:

This exam is an open-book, open-notes, individual-work exam. Please write your name only on this page. Do not turn the page until instructed, in order that everyone may have the same time. Then, be sure to look at all problems before deciding which one to do first. Some problems are easier than others, so plan your time accordingly. You have 50 minutes to work.

Write the answer to each problem on the page on which that problem appears. You may use the back of that same sheet if you need additional space. You may also request additional paper.

Name: _____

Problem	Page	Possible	Score
1	2	12	
2	3	12	
3	4	12	
Total		36	

1. **[12 Points]** The n^{th} Fermat number can be found by starting with 2, squaring it n times, and then adding 1. (By "squaring it n times" we mean squaring 2, then squaring the result, etc.) Write a SLIM assembly-language program that reads in n, computes the n^{th} Fermat number, and writes it back out. (This is exercise 11.7 from page 363.)

2. [**12 Points**] Write a procedure to copy a vector. That is, it should take a vector as its argument and produce a newly created vector as its result that is the same size, and has the same value in each position as the original vector did.

3. [**12 Points**] Draw an environment diagram showing the result of evaluating the following three definitions and one expression. Mark the environment `(f 2)` is evaluated in the first time with a 1 and the environment `(f 2)` is evaluated in the second time with a 2. When a variable's value is changed, show the old value with an X through it as well as the new value.

```
(define make-accumulator
  (lambda (a)
    (lambda (x)
      (set! a (+ a x))
      a)))

(define value-at-two
  (lambda (f)
    (f 2)))

(define acc (value-at-two make-accumulator))

(value-at-two acc)
```