2011Sp CS10 Paper Midterm Answers

**Question 1:** These students can “read” but not “write”; digital fluency should be designing, creating and remixing too!

**Question 2:** software developers

**Question 3:** throughput (amt of useful work done) and enjoyability (for players)

**Grading:** 2 pts
+1 quality and quantity of generated “work”
+1 how much fun the players have (~ length of time the game is played)

**Question 4:** simulation

**Question 5:**
- Blogs and web pages and Twitter allowed people to be information sources (once reserved for professional reporters).
- Cheap digital cameras and photo-editing software allow people to produce quality photos once reserved to professional photographers.
- Podcasts allow people to have their own talk radio station
- Ebay (for small numbers) and websites+fedex+paypal allow people to make and sell their stuff online, usually reserved to traditional brick-and-mortar stores with high initial investments to get companies rolling.
- Etrade allows people to manage their own money, one reserved to stock brokers.
- Digital music sharing services (+youtube+fedex+paypal) allow small bands to gather a following and sell their material online, usually reserved to record companies
- Email
- (favorite student answer: “Radios. Before that, cats held the power”)

**Question 6:** It’s a remarkable engineering task to do what they do at scale (i.e., with the massive # of users they have, now in the hundreds of millions) and in real time!

**Grading:** 2 pts
+1 scale of tweets (# of users x # of tweets x # of recipients)
+1 how hard it is to do this all in real time (< 1 sec)

**Question 7:** Jen has *already* searched the web, made a copy, and built an index that it uses to search against in real time (with the help of lots of fast computers) to give real-time results.

**Grading:** 2 pts
+2 if mentioned pre-loaded cache of web, and something about how the index is made
+1 if mentioned don’t mention storing the contents in a cache or indexni
+1 (bonus) use many computers

**Question 8:** The RIAA hires MediaSentry which uses an automated program to search for servers just like yours, and (after verification that the songs are copyrighted) they file a lawsuit along with a settle-for-$4k letter; they’ve sent 26K of these out to people just like you in the last 5 years, and the minimum damages are $750 per song if you’re found guilty!

**Grading:** 2 pts
+2 if mention
+1

**Question 9:**
- Many more accidents (broken wrists, etc); imagine the density of SF streets during rush hour all filled with Segway drivers, some of whom may not be experts.
- Reduced exercise for many people whose only exercise is the walking they do.

**Question 10:**

a)

b)

**Grading:** 3 pts for each
- 2 if you swapped an operation or two
- 1 if you had a correct operator
- ½ if you wrote something

**Question 11:**

a. A “race condition”.

**Grading:** 2 if you had “parallel” or “concurrent” or some variant thereof
+1 if you had race condition (bonus point)
1½ if you seemed to have the idea of concurrency, but didn’t have the correct terminology.

All the numbers 1-7.
1. A reads 0, B reads 0 and writes 2, C reads 2 and writes 6, A writes 1
2. B reads 0, A reads 0 and writes 1, C reads 1 and writes 5, B writes 2
3. A reads 0, C reads 0 and writes 4, A writes 1, B reads 1 and writes 3
4. C reads 0, A reads 0 and writes 1, B reads 1 and writes 3, C writes 4
5. A reads 0, B reads 0 and writes 2, A writes 1, C reads 1 and writes 5
6. B reads 0, A reads 0 and writes 0, B writes 2, C reads 2 and writes 6
7. A reads 0, and writes 1, B reads 1 and writes 3, C reads 3 and writes 7

Grading:
4 if you had all of the numbers
3 if you had an extra number (0, 8, etc.) or missing a number.
2 if you had 1,2,4 or 3,5,6 or 7
1 if you only had one of the values (or had a list of single values)
0 if you didn’t write anything

Question 12:

ancestors(PERSON)
    if parents-found?(PERSON)
        report( 1 + ancestors(father(PERSON)) + ancestors(mother(PERSON)) )
    else
        report( 1 )

Grading: 10 total
9 If you didn’t add yourself to the recursive call
8 for mangled base case, conditional was incorrect, or didn’t return a number
6 for two of the above problems
4 if you used a recursive solution
2 if you had the conditional correct
½ if you had a plus

Question 13:

a. Linear
Grading: 2 points
  1 point if close to linear
b. Bill
  3
  if ( letter(1) of (WORD) > letter(2) of (WORD) )
Grading: 1 point for Bill

  3 points for finding and fixing the line correctly
  2 points for finding the correct line, but with the incorrect fix
c. aba
  5
  set (WORD) to (all-but-1st-letter-of(WORD))
Grading: 2 points for smallest wrong answer
  1 point for finding an incorrect answer, but not the smallest (e.g., abab)
  1 point for not assuming that (b) was correctly fixed (e.g., aa)
  1 point for giving the value “3” without specifying a bad input

  2 points for fixing the line correctly
  1 point for finding the correct line, but with the incorrect fix

Grading: 10 total
2011Sp CS10 Online Midterm Answers

Castle Edge Fractal:

```
repeat 4
  Draw Castle Edge Fractal num * size
  turn 90 degrees
```

```
if n = 0
  DrawLine len
else
  turn 60 degrees
  DrawLine len / 3
  turn 60 degrees
  Draw Castle Edge Fractal n - 1 len / 3
  turn 90 degrees
  DrawLine len / 3
  turn 60 degrees
  DrawLine len / 3
  turn 60 degrees
  DrawLine len / 3
  turn 90 degrees
  Draw Castle Edge Fractal n - 1 len / 3
  turn 90 degrees
  DrawLine len / 3
  turn 60 degrees
```

```
Triangle Fractal:

```plaintext
if n = 0
   pen down
   move len steps
   pen up
else
   turn 30 degrees
   Draw Triangle Fractal n = len / sqrt(3)
   turn 120 degrees
   Draw Triangle Fractal n = len / sqrt(3)
   turn 120 degrees
   Draw Triangle Fractal n = len / sqrt(3)
   turn 20 degrees
```
Square Edge Fractal:

1. DrawLine (len)
   - Pen down
   - Move len steps
   - Pen up

2. DrawSquare (len)
   - Pen down
   - Repeat 4
     - Move len steps
     - Turn 90 degrees
   - Pen up

3. Draw Square Edge Fractal (n, len)
   - If n = 0
     - DrawSquare (len)
   - Else
     - Repeat 4
       - Turn 45 degrees
       - Draw Square Edge Fractal (n - 1, len / 2)
       - Turn 45 degrees
       - DrawLine (len / 2)
       - Move len / 2 steps
       - Turn 90 degrees
Sierpinski Hex Fractal:

```
if n = 0
    DrawLine len
    move 0 len steps
else
    turn 60 degrees
    move len / 2 steps
    turn 150 degrees
    Draw Sierpinski Hex Fractal n = 1 len / 2
    turn 120 degrees
    Draw Sierpinski Hex Fractal n = 1 len / 2
    move len / 2 steps
    turn 60 degrees
    move len / 2 steps
    turn 150 degrees
    Draw Sierpinski Hex Fractal n = 1 len / 2
    turn 120 degrees
    move 0 len steps
```