

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)

Unend(Middle(Right (Go Bears and Beat Stanford)))
Unend(Unend(Unend(Right (Go Bears and Beat Stanford))))
Unend(Unend(Right(Unend(Go Bears and Beat Stanford))))
Unend(Middle(Unend(Right(Go Bears and Beat Stanford))))
Unend(Middle(Right(Unend(Go Bears and Beat Stanford))))

b)

Unend(Right(Triple(Unend (ihigh))))
Unend(Triple(Unend(Left(Left (ihigh))))
Unend(Left(Triple(Unend(Left(ihigh))))
Unend(Triple(Right(Unend(ihigh))))
Unend(Left(Left(Triple(Unend(ihigh))))
Unend(Triple(Left(Left(Unend(ihigh))))
Unend(Triple Left(Unend(Left(ihigh))))

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)

1 ½ if you seemed to have the idea of concurrency, but didn't have the correct terminology.

All the numbers 1-7.

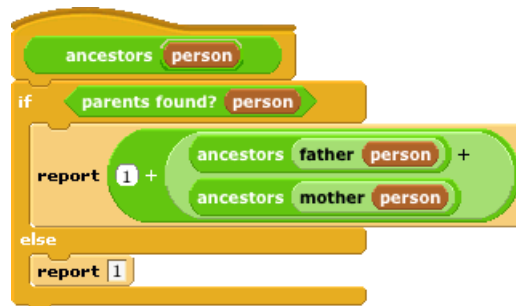
1. A reads 0, B reads 0 and writes 2, C reads 2 and writes 6, A writes 1
2. B reads 0, A reads 0 and writes 1, C reads 1 and writes 5, B writes 2
3. A reads 0, C reads 0 and writes 4, A writes 1, B reads 1 and writes 3
4. C reads 0, A reads 0 and writes 1, B reads 1 and writes 3, C writes 4
5. A reads 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



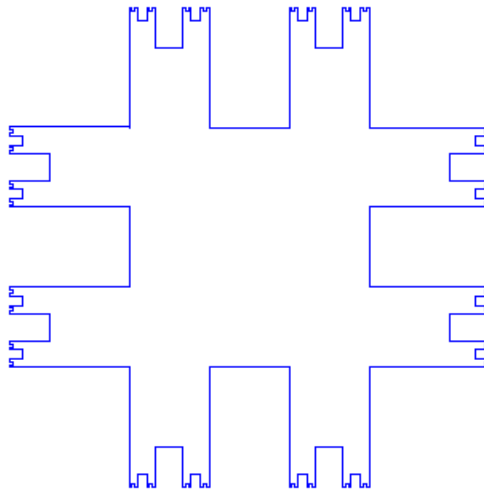
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Answers

Castle Edge Fractal:

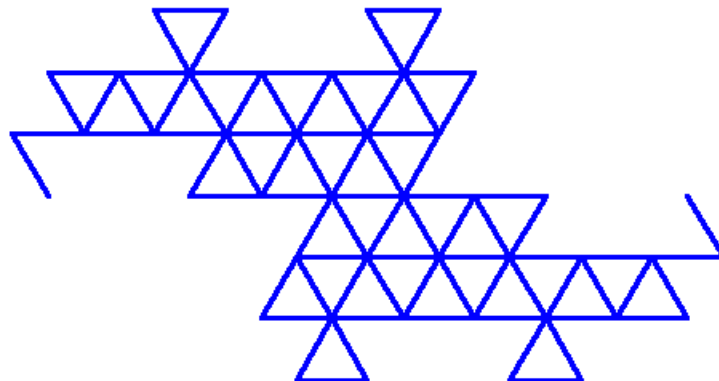
```
repeat 4
  Draw Castle Edge Fractal num 2 * size
  turn 90 degrees
  DrawLine len
  pen down
  move len steps
  pen up
```

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



Triangle Fractal:

```
Draw Triangle Fractal n len
if n = 0
  pen down
  move len steps
  pen up
else
  turn 30 degrees
  Draw Triangle Fractal n - 1 1 * len / sqrt of 3
  turn 120 degrees
  Draw Triangle Fractal n - 1 1 * len / sqrt of 3
  turn 120 degrees
  Draw Triangle Fractal n - 1 1 * len / sqrt of 3
  turn 30 degrees
```

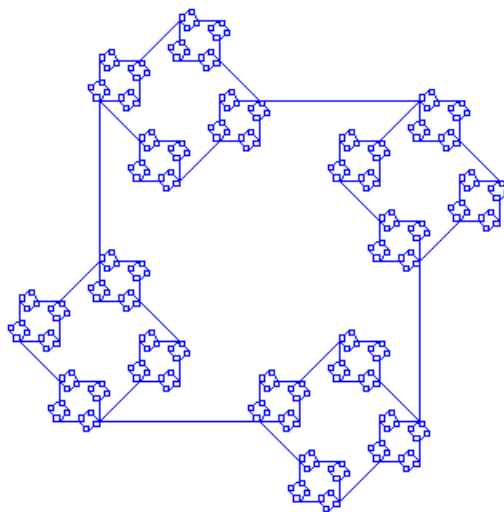


Square Edge Fractal:

```
DrawLine len
pen down
move len steps
pen up

DrawSquare len
pen down
repeat 4
  move len steps
  turn 90 degrees
pen up
```

```
Draw Square Edge Fractal n len
if n = 0
  DrawSquare len
else
  repeat 4
    turn 45 degrees
    Draw Square Edge Fractal n - 1 len / sqrt of 8
    turn 45 degrees
    DrawLine len / 2
    move len / 2 steps
    turn 90 degrees
```



Sierpinski Hex Fractal:

```
DrawLine len
pen down
move len steps
pen up

Draw Sierpinski Hex Fractal n len
if n = 0
  DrawLine len
  move 0 - len steps
else
  turn 60 degrees
  move len / 2 steps
  turn 180 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 180 degrees
  Draw Sierpinski Hex Fractal n - 1 len / 2
  turn 120 degrees
  move 0 - len steps
```

