COS126 Exam1 Mini-Test Solutions

1. **Short Answer**

   1. 3.0
   2. $6.022e23$
   3. True.
   4. True.
   5. False.
   6. java Recipe < cookbook.txt
      java Recipe < cookbook.txt > meal.txt
      java Recipe | java HungryThing

2. **Doubles, StdIn, Analysis of Algorithms**

   a) Fill in the trace table:

x	y	bestx	besty	bestDist2	xi	yi	dist2
1.0	5.0	NaN	NaN	pos. inf.	1.0	3.0	4.0
		1.0	3.0	4.0	5.0	3.0	20.0
					9.0	6.0	65.0
					2.0	6.0	2.0
		2.0	6.0	2.0	5.0	6.0	17.0

   b) What does the program print? **Closest point = (2.0, 6.0)**

   c) What kind of input would cause `NaN, NaN` to print out? **Empty input**

   d) In general, what does this program do? **Prints the point read in from standard input that is closest to the point entered on the command-line.**

   e) Suppose we read in N points. How many comparisons of `dist2` and `bestDist2` will the program make? **N comparisons.**

3. **Recursion, Debugging (from Spring04, Exam 1, Question 4)**

a.

```
                    func(3)
                      |
              2*func(2) + 5*func(1)
                  |
      2*func(1) + 5*func(0)
                    |
          2*func(-1) + 5*func(-2)
```

b. Change `if (j == 1) return 1;` to `if (j <= 1) return 1;`

4. **Performance**

X. Half a day.

Using the doubling hypothesis, the increase appears to be quadratic. So, when N increases by 10 (from 10,000 to 100,000) the time increases by 100 (from 8 to 800 minutes). 800 minutes is a little over 13 hours, so the best of the answers is half a day.