CS100J Prelim II answers Netid djg17 **Name David Gries**

1. (a) String line;

1. (b)
```
int k= 1;
  // inv: all chars of line[0..k–1] are the same
  while (k != line.length() &&
            line.charAt(0) == line.charAt(k))
      { k= k+1; }
  /* { all chars of line[0..k–1] are the same and
     char line[k] doesn't exist or is different */
  System.out.println(k);
```

2. See Section 2.7.2 of the text.

3.
```
// precondition: n > 0
b= 1;
// invariant:  b is a power of 2   and    b <= n
while (n >= 2*b) {
   b= 2*b;
}
// post: b is a power of 2 and b <= n and n < 2*b
```

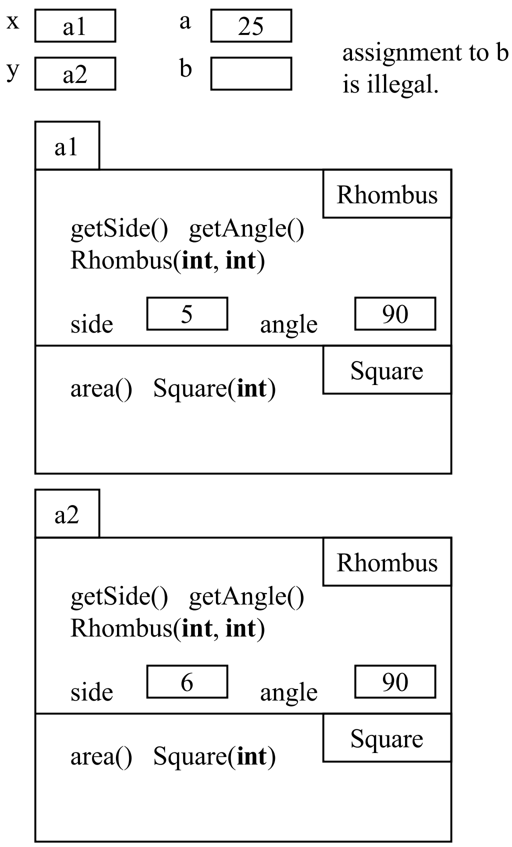
4. body of constructor:
```
{
   numerator= a; denominator= b;
   if (b < 0) {
      numerator= –a; denominator= –b;
}
```

body of equals:
```
{
   this.reduce();     otherFrac.reduce();
   return (numerator == 0 && otherFrac.numerator == 0) ||
          (numerator == otherFrac.numerator &&
            denominator == otherFrac.denominator);
}
```

5.
```
/** An instance is a square */
public class Square extends Rhombus {
  /** Constructor: square with side s */
  public Square(int s)
    { super(s, 90); }

  /** = area of this square */
  public int area()
    { return getSize() * getSize(); }
}
```

6.



assignment to b is illegal.

7a. The repetend is the body of the while-loop.

7b. 1. How does it start? (How do we make the invariant true?)

2. When does it stop? (What condition, along with the invariant, ensures that the postcondition is true?)

3. How does it make progress?

4. How does it fix the invariant? (The repetend has to terminate with the invariant true.)