

Computer Science I – Fall 2010
Recitation #13: Review Questions

1) Recursion Money in bank accounts grows at a rate known as the annual percentage yield, or APY. For example, if you have \$1,000 in the bank with an APY of 1.10, then after one year, you'll have \$1,100 in the bank. The APY is applied to the new balance every year, so if you leave \$1,000 in the bank for two years, you'll end up with $(\$1,100 * 1.10) = \$1,210$. Write a **recursive** function to compute and return the amount of money in a bank account after a number of years. This function should take in the starting amount and the APY as doubles, and the number of years as an int.

```
// Pre-condition: money > 0, 1 < apy < 2, 0 <= years <= 100
double bank(double money, double apy, int years)
{

}

}
```

2) Summations

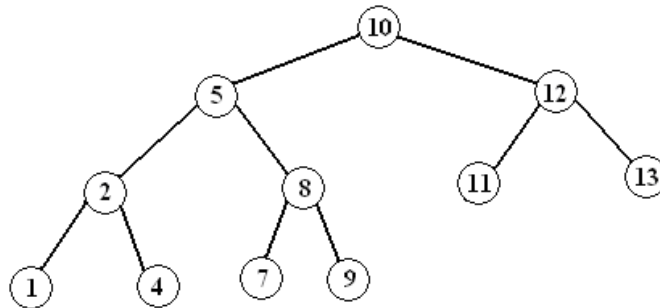
a) Determine a closed-form solution for the following sum in terms of n : $\sum_{j=n-10}^n 5jn$.

(You may assume that $n \geq 12$)

b) Determine a closed-form solution for the following sum in terms of n : $\sum_{i=1}^n \sum_{j=1}^i (2i)$

HINT: $\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$

3) AVL Trees Consider the following AVL Tree:



a) Show the state of the AVL after inserting the value 3. Show the state both before and after any necessary rotations.

b) Show the result of inserting the value 6 into the original AVL tree (i.e. ignore part a when answering this part). Show the state both before and after any necessary rotations.

4) Recursion Consider the following recursive function:

```
// Pre-condition: y is non-negative.
int mysterious(int x, int y) {
    if (y == 0) return x;
    return 2*mysterious(x, y-1);
}
```

a) What is the return value of `mysterious(3, 2)`?