City Semester
Cumulative Test
Show all work for full credit.

1. Simplify the following expressions involving factorials without a calculator.

   (a) $\dfrac{100!}{25 \cdot 99!}$

   (b) $\dfrac{2 \cdot (n+2)!}{n!}$

   (c) $2(1! + 3!)!$

2. A typical combination lock has a dial with numbers from 0 to 39. If the lock only takes combinations consisting of 3 numbers, how many different combinations are possible?(note: you can't have two consecutive numbers be equal. ie. 0-0-2 not allowed, but 0-2-0 is allowed.)

3. If you have the combination lock from the previous problem and you can't remember any of the numbers, but you remember two of them are the same, how many combinations are possible? Explain how you got your answer.

4. How many four digit numbers start with an even number and end with an odd number?

5. Find the number of permutations of the word VIVIFY.

6. A town council consists of 8 members including the mayor.

   (a) How many different committees of 4 can be chosen?

   (b) How many of these committees of 4 do not include the mayor?

7. Let $\{10, 11, 11, 13, 14, 16, 16, 20, 24, 30\}$ be a set of data.

   (a) Find the data set's mean.

   (b) Give the data set's standard deviation. Show all work.

(c) Give the data set's five number summary and IQR.

8. The half life of amoxicillin is 61 minutes. The typical prescription for amoxicillin is 500 mg every 8 hours. If you take one 500 mg tablet, how much is still in your bloodstream 8 hours later (before you take the next dose)? If you only take one dose, when will there only by 1mg left in your bloodstream?

9. Solve for x.

(a) $3 + \log(6x) = 21$

(b) $1 + 2(3^x) = 21$

10. Evaluate the following series.

(a) $\displaystyle\sum_{n=1}^{100}(3n - 1)$

(b) $\displaystyle\sum_{n=2}^{\infty}5\left(\frac{1}{3}\right)^{n-1}$

Please write out the following statement and sign your name to it as testament to its truth. 'I have worked on this assignment for at most 60 minutes and I have neither given nor received any unauthorized help on this work'