City Semester
Problem Set #6
Show all work for full credit.

Name:____________________________

1. Generate the first 5 terms of each of the following sequences.
   (a) $a_n = (-1)^n 2n^2$

   (b) $b_n = 3n - 1$

   (c) $c_n = 3\left(-\frac{1}{2}\right)^n$

   (d) $d_n = d_{n-1}^2 - 1$ and $d_1 = 2$

2. Given an arithmetic sequence that increases by 4 each term, and starts at -5, find the 100th term of this sequence.

3. Given a geometric sequence with ratio 1/3 and first term 81, find the 10th term of this sequence.

4. Evaluate the following series.

(a) $\sum_{n=1}^{50} (3n+1)$

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

(b) $\sum_{n=1}^{20} 2\left(\frac{3}{2}\right)^{n-1}$

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

(c) $\sum_{n=1}^{20} 3\left(\frac{3}{4}\right)^{n-1}$

(f) $\sum_{n=0}^{\infty} \left(\frac{4}{5}\right)^{n}$

5. Use the properties of logs to rewrite each of these expression in terms of x and y where $x = \log(A)$ and $y = \log(B)$.

   (a) $\log(A/B)$

   (b) $\log(\sqrt{A}/B)$

   (c) $\log(A^3B^5)$

   (d) $\log(2\sqrt{A^3}/B^5)$

6. The doubling time of a population of gnats is 15 hours. Assuming the population can be modeled exponentially give the model of the populations of gnats if you know at time 7 hours there were 120 gnats.

7. The half life of caffeine in the bloodstream is 4 hours. Assume the caffeine decays exponentially. If I drink a cup of coffee every 6 hours for the next 2 weeks approximately how much caffeine is in my bloodstream during that second week?