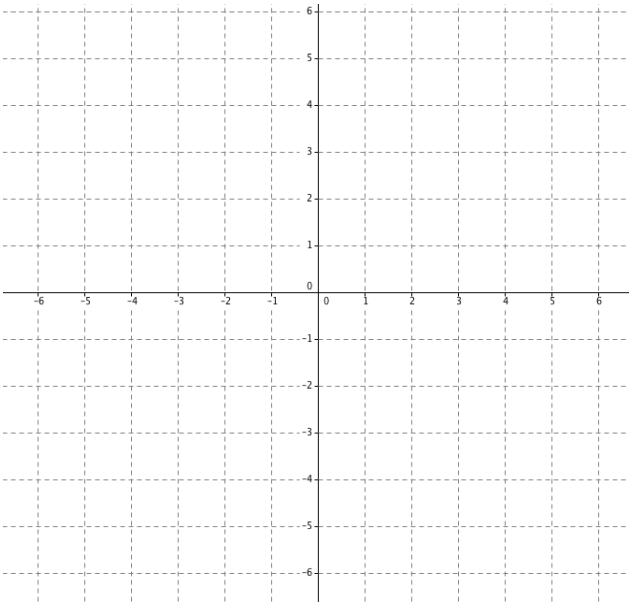
City Semester Name:_____

Test on Logarithms

Show all work for full credit.

1. Sketch the graph of $f(x) = \log(x+2) - 3$. State the domain, range, and asymptotes of $f(x)$.



2. Evaluate each expression without the use of a calculator. Show all steps of your reasoning.

   (a) $\log_3 \sqrt{27}$

   (b) $\log_2 80 - \log_2 10$

   (c) $\log_8 4$

   (d) $\log_6 4 + \log_6 9$

3. Using the properties of logarithms combine the following expression into a single logarithm: $\ln(x) - 2\ln(x^2+1) + \dfrac{1}{2}\ln(3-x^4)$

4. Solve for x. Round to three decimal places

   (a) $5\ln(3-x) = 4$

   (b) $10^{x+3} = 6^{2x}$

   (c) $\log_2(x+2) + \log_2(x-1) = 2$

   (d) $4^x - 5(2)^x + 6 = 0$

5. The half life of palladium-100 is 4 days. After 20 days a sample has reduced to a mass of 0.375 grams.

   (a) What was the initial mass of the sample of palladium-100?

   (b) Give the function that models the mass of palladium-100 remaining after t days.

   (c) What is the mass after 3 days?

   (d) After how many days does only 0.08g of the sample remain?

6. On a cold winter day (20°F), your car overheats (at 230°F). You park it and leave it to cool. The temperature of the engine T, t minutes after you park, satisfies Newton's Law of Cooling. (Recall the law states that $(T - T_a) = Ae^{kt}$ where T_a is ambient temperature, A is a constant of proportionality and k is the cooling constant.)

   (a) What is the value of A?

   (b) Solve for k, if after 20 minutes the engine is 50°F. Round to 4 decimal places.

   (c) When will the engine be at 30°F? Round to 3 decimal places.

7. 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'