

Test 3C - MTH 1210
Dr. Graham-Squire, Fall 2013

Name: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

(signature)

DIRECTIONS

1. Don't panic.
2. Show all of your work and use correct notation! A correct answer with insufficient work or incorrect notation will lose points.
3. Clearly indicate your answer by putting a box around it.
4. Cell phones and computers are not allowed on this test. Calculators are allowed on the first 4 questions of the test, however you should still show all of your work. No calculators are allowed on the last 6 questions.
5. Give all answers in exact form, not decimal form (that is, put π instead of 3.1415, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.
6. If you need it, the quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.
7. Make sure you sign the pledge.
8. Number of questions = 10. Total Points = 80.

1. (12 points) The population of Fire-bellied Newts in the smaller of the Twin Lakes on Orcas island behaves according to the function

$$p(t) = \frac{5600}{2 + 26e^{-0.044t}}$$

where t is measured in years.

- (a) What is the population initially?
- (b) What is the population in the long run (as t goes to infinity)? Explain your reasoning.
- (c) How many fire-bellied newts are there in the lake when $t=10$? Round to the nearest newt.
- (d) When does the population reach 1000? Round to the nearest year.

2. (10 points) Use laws of logarithms to expand and simplify the expressions as much as possible.

(a) $\ln \left(\frac{x^2 y^5}{e^3} \right)$

(b) $\log_2 \sqrt{x \sqrt{y}}$

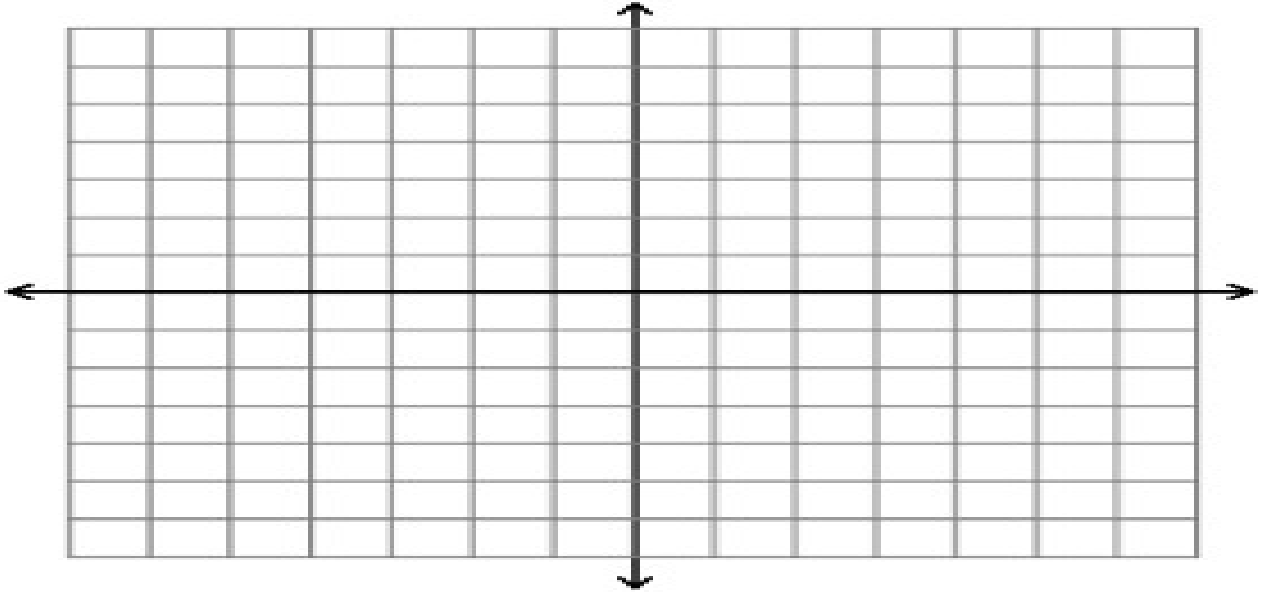
3. (10 points) The rabbit population feeding off of Eddie's garden was 10 rabbits in the year 2010. In 2013, the number had grown to 20. Use an exponential growth model to calculate in what year the population will reach 1000 rabbits. Round your answer to the nearest year.

4. (5 points) Solve the equation using any method you choose. Make sure to show your work (or explain what you did), and round to the nearest 0.001.

$$(1.00625)^{12t} = 2$$

Extra Credit(2 points) What quadrant does $t = \frac{517\pi}{8}$ lie in? Explain how you got your answer.

5. (6 points) Sketch the graph of the function $y = \tan \frac{1}{2} \left(x - \frac{\pi}{3} \right)$. Make sure to label your axes with the appropriate numbers to indicate how the function is shifted.



6. (8 points) State if the following are True or False. If False, explain why.

(a) $\ln\left(\frac{x}{y}\right) = \frac{\ln x}{\ln y}$

(b) $\log_7 7^7 = 7$

(c) $-\ln\left(\frac{1}{A}\right) = \ln A$

(d) $(\log_3 9)^x = x \log_3 9$

7. (5 points) Find all values of x that solve the equation. Make sure to show your work and explain your reasoning.

$$\log_2(x^2 + 4x + 3) = 3$$

8. (8 points) Find the exact value (in its simplest form) for the following. If an expression does not exist, write DNE and explain why.

(a) $\sin \frac{\pi}{3}$

(b) $\tan \frac{9\pi}{4}$

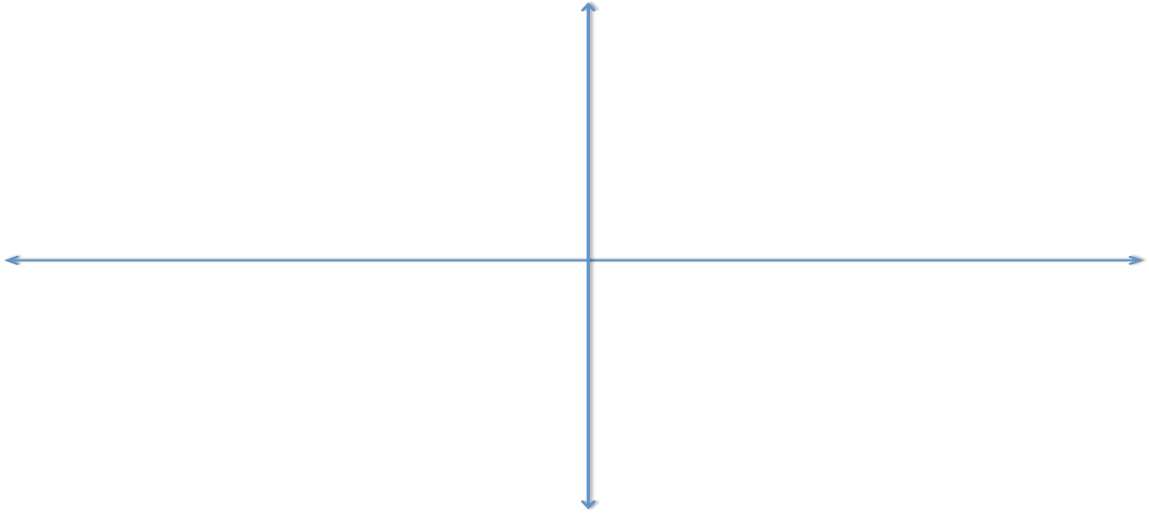
(c) $\sec \frac{-2\pi}{3}$

(d) $\cot \frac{-16\pi}{4}$

9. (6 points) Given that $\csc t = \frac{5}{4}$ and t lies in Quadrant II, use trigonometric identities to find the value of $\tan t$.

10. (10 points) Sketch graphs of the following functions. Make sure to label your axes with the appropriate numbers to indicate how the function is shifted.

(a) $y = -\sin\left(x - \frac{\pi}{3}\right)$



(b) $y = \frac{1}{2} \cos 4x$

