

Math 120 (Pezzoli)
Spring 2015
Midterm #2

Name _____

TA: _____

Section: _____

Instructions:

- Your exam contains 4 problems.
- Your exam should contain 5 pages; please make sure you have a complete exam.
- Box in your final answer when appropriate.
- Unless stated otherwise, you **MUST** show work for credit. No credit for answers only. If in doubt, ask for clarification.
- Your work needs to be neat and legible.
- You are allowed one 8.5×11 sheet of notes (both sides). Graphing calculators are **NOT** allowed; scientific calculators are allowed.
- Round off your final answers to 2 decimal places, unless you are asked for exact answers.

Problem #1 (15 pts) _____

Problem #2 (13 pts) _____

Problem #3 (13 pts) _____

Problem #4 (9 pts) _____

TOTAL (50 pts) _____

1. Knotweed is an invasive plant. In the year 2000 there were 100 knotweeds in Greenforest. In 2002 the number of knotweeds in Greenforest had grown to 150 , and there were 200 knotweed plants in Greenforest in 2005. Assume that the number of knotweed plants in Greenforest can be modeled by a linear to linear function .

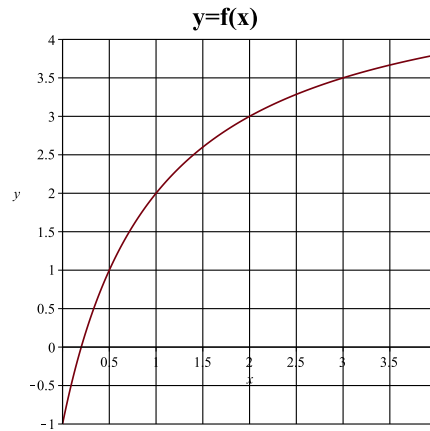
(a) Let $f(t)$ be the function defined on $0 \leq t < \infty$, giving the number of knotweeds in Greenforest t years after 2000. Find a formula for $f(t)$.

(b) In the long run how many knotweeds will there be in Greenforest, according to this model ?

(c) Find a formula for $f^{-1}(w)$, the inverse of $f(t)$.

(d) Calculate $f^{-1}(250)$ and explain in words what is the meaning of this value.

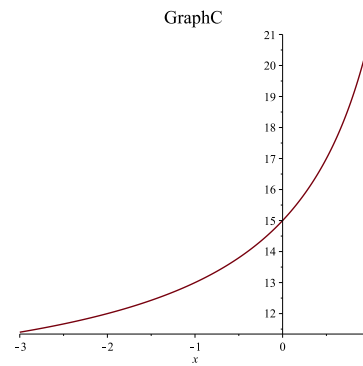
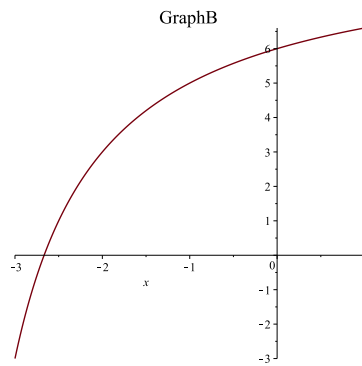
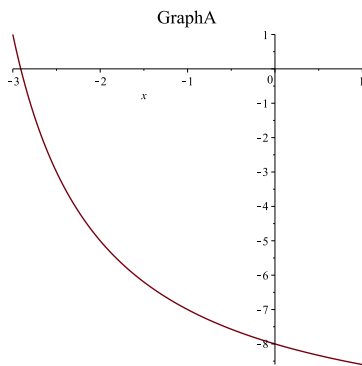
2. Below you are given the graph of $f(x)$. The domain of $f(x)$ is $0 \leq x \leq 4$ and the range is $-1 \leq y \leq 3.8$



a) What is the value of $f(f(2))$?

b) What is the value of $f^{-1}(2)$?

c) Which of the following is the graph of $2f(x+3)-1$? Circle the correct graph.



d) Find the domain of $\frac{f^{-1}(2x+1)}{x-1}$

3. Town A population triples every 100 years. City B population doubles every 90 years. In the year 2000 the two cities have the same population of 10000. When will city A have twice as many inhabitants as city B ?

4. The cost $c(x)$ of making x items is $c(x) = 2x^2 - 200x + 15000$. How many items do you need to make in order to minimize the cost ?

Suppose that the revenue $r(x)$ produced by selling x of the above items is also modeled by a quadratic function. The revenue produced by selling 0 items is of course 0, and the revenue is at a maximum of \$ 30,000 when 100 items are sold. How many items x should be made and sold in order to maximize the profit $p(x) = r(x) - c(x)$ (revenue - cost)?