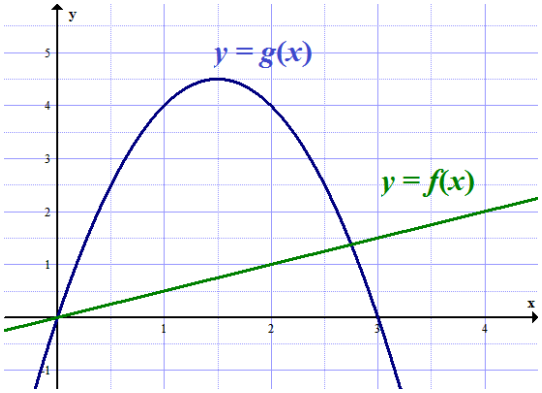
Math 123 Exam 2A

November 4, 2013 Professor Ilya Kofman

NAME: _____



1. Evaluate each expression using the graph above.

(a) $(f+g)(1) =$ _____

(b) $(fg)(2) =$ _____

(c) $(f \circ g)(1) =$ _____

(d) $(f \circ g \circ f)(2) =$ _____

(f) Does $f(x)$ have an inverse for all x? **Y** **N**

(g) Does $g(x)$ have an inverse for all x? **Y** **N**

2. You want to fence off a rectangular garden adjacent to a barn (with no fence along the barn). Also, the garden will be divided in half with a fence perpendicular to the barn. Find the area of the largest garden possible with 180 ft of fencing.

. Area = _____

3. If $f(x) = 3x + 8$ and $g(x) = \sqrt{x - 5}$, find the following:

(a) $f \circ g$

(b) $g \circ f$

(c) $f \circ f(2)$

4. Find the inverse of $f(x) = \sqrt[3]{4 - 7x}$. $f^{-1}(x) =$_____

5. Find the inverse of $f(x) = \ln(3x/5)$. $f^{-1}(x) =$_____

6. Evaluate the following expressions.

(a) $\log_6 72 + \log_6 3$

(b) $\log_{27} 9$

(c) $\ln \frac{\sqrt[3]{e}}{e^4}$

7. Combine into a single logarithm: $\ln(3x + 5) + 2\ln(x^3 - 1) - \frac{2}{3}\ln(4x - 7)$

8. If $\ln a = -5,\ \ln b = 7,\ \ln c = -4,$ evaluate the following expressions.

(a) $\ln \dfrac{b^3}{a^2c^4}$

(b) $\ln(b\sqrt[3]{ac})$

(c) $\ln\,(e^3/b)$

9. Solve the following equations.

(a) $4^{2x+1} = 5^{3x}$

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

(c) $3\ln(5-x) = 2$

10. Suppose \$7,000 is invested in an account paying 4.5% interest per year (APR).

(a) Find the amount in the account after 10 years if interest is compounded semiannually.

(b) How long will it take for the account to have \$12,000 if interest is compounded monthly?

(c) Find the amount in the account after 12 years if interest is compounded continuously.

(d) How long will it take for the account to have \$12,000 if interest is compounded continuously?

11. A culture initially has 2,000 bacteria. After two hours it has 5,000 bacteria.

(a) Find the function that models the population after t hours.

(b) Find the population after 1.5 hours.

(c) When will the population reach 20,000?

12. The half-life of carbon-14 is 5730 years.

(a) If the initial amount is 15 g, find the function that models the amount of carbon-14 after t years.

(b) If the initial amount is 15 g, how much carbon-14 is left after 10,000 years?

(c) If a mummy contains 62% of its original carbon-14 amount, how old is it?