

Math 111
Exam 1
April 23rd, 2009

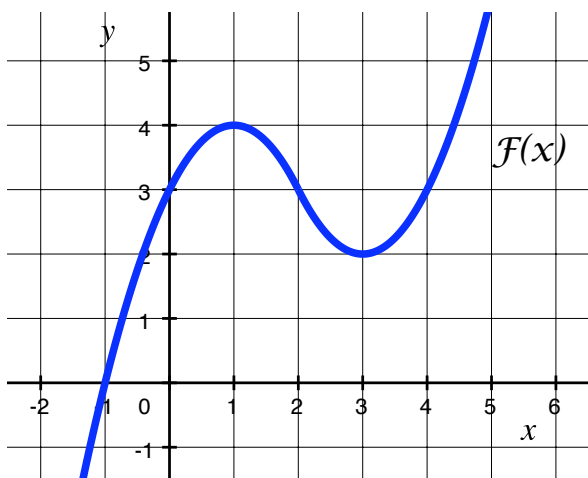
Name: _____

1. Your exam contains 6 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values vary and these are indicated on each problem. You have 50 minutes for this exam.
3. Make sure to ALWAYS SHOW YOUR WORK; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back of the exam and clearly indicate this.
5. You are allowed one 3×5 notecard of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form as **simplified as possible** unless otherwise specified.

Problem	Total Points	Score
1	12	
2	19	
3	22	
4	15	
5	18	
6	14	
Total	100	

1. (12 pts.) Write an equation of a line L that is perpendicular to the line $8x + 2y = 6$. The two lines intersect at $x = 8$.

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2. (19 pts.) The function $F(x)$ is given in the graph below.



- (a) (3 pts.) Find $F(0)$.

- (b) (5 pts.) Solve $F(x) = 3$.

- (a) (7 pts.) Find the rate of change of $F(x)$ from $x = 1$ to $x = 4$.

- (b) (4 pts.) Estimate the interval(s) for which $F(x)$ is concave up.

3. (22 pts.) The height of a cannonball at t seconds is given by $h(t) = -16t^2 + 72t$ in feet.

(a) (8 pts.) At what time does the cannonball land?

(b) (6 pts.) How high is the cannonball at 2 seconds?

(c) (8 pts.) When is the height of the cannonball 32 feet?

4. (15 pts.) Suppose the population (in thousands) of Springfield is given by $P = f(t) = 7 + 0.4t$ where t is the number of years past 2000.

(a) (6 pts.) Find $f(15)$ and interpret it in terms of time and population.

(b) (5 pts.) Find $f^{-1}(15)$ and interpret it in terms of time and population.

(c) (4 pts.) What is the rate of change of the population given by the equation? (Include units.)

5. (18 pts.) Consider the functions $f(x) = 1.5x$ and $g(x) = \sqrt{x+3} + 4$.

(a) (5 pts.) Find $g(f(4))$.

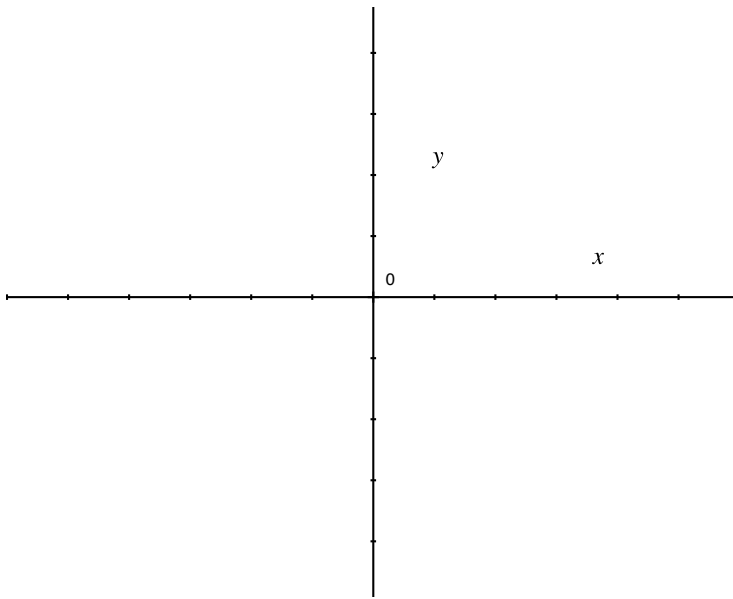
(b) (7 pts.) Find $f(g(x))$.

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(c) (6 pts.) Given that $y = g(x) = \sqrt{x+2} + 3$, find $g^{-1}(y)$.

6. (14 pts.) Consider the piecewise defined function $G(x) = \begin{cases} 2 - x & \text{for } x < 0 \\ 2 & \text{for } 0 \leq x < 1 \\ x^2 & \text{for } 1 < x \end{cases}$.

(a) (9 pts.) Sketch $G(x)$ below. Put a scale on your axes.



(b) (5 pts.) What is the domain and the range of $G(x)$?