

MATHEMATICS 112 EXAM TWO April 10th, 2007

Name: _____

Instructor and section: _____

1. There are 8 problems on 9 pages (counting this page).
2. No graphing or programmable calculators, notes, or books are allowed. Scientific calculators are allowed but are not needed.
3. Give exact answers (fractions, square roots, etc.). Decimal approximations may not receive full credit.
4. You do not need to simplify your answers unless told to. Answers such as $x = \frac{3^2\sqrt{25} + 6}{12}$ are okay.
5. Use only the scratch paper provided. Work appearing on your scratch paper will not be graded.
6. Show your work and make your methods clear. Unjustified answers may receive no credit.
7. Put your final answer in the box provided.

Problem	Possible Score	Your Score
1	15	
2	15	
3	12	
4	12	
5	12	
6	12	
7	10	
8	12	
TOTAL	100	

1. (5 points each) Simplify each of the following expressions as much as possible. (Answers on this page will receive either full credit or no credit.)

(a) $\sqrt{28x^4y^4 + 4x^5y^6} =$

Answer:

(b) $\frac{3t}{t+1} - \frac{t-1}{t} - \frac{1}{t^2+t} =$

Answer:

(c) $(2^x + 2^y)(2^{-x} + 2^{-y}) =$

Answer:

2. Consider the function $f(t) = t^2 - 2t$.

(a) (5 points) Find the range of $f(t)$.

Answer:

(b) (5 points) Find the domain of $\frac{1}{f(t)}$.

Answer:

(c) (5 points) Find a function $g(t)$ so that $f(t) + g(t) = t^2 + 2t + 3$ for all values of t .

Answer:

3. (a) (3 points) Find the average rate of change of $f(x) = \sqrt{x}$ on $[9, 16]$.

Answer:

- (b) (3 points) Find the average rate of change of $g(x) = x^3 - x$ on $[2, 3]$.

Answer:

- (c) (6 points) Let $f(x) = \frac{-3}{x+4}$. Find $f^{-1}(x)$.

Answer:

4. (a) (6 points) Let $f(x) = (x-1)^2$. Suppose the graph of $f(x)$ (a parabola) is translated 4 units to the right and 3 units up, and then reflected about the y -axis. Find the vertex of the new parabola.

Answer:

- (b) (6 points) Find a quadratic polynomial whose graph passes through the origin and has vertex $(2, 4)$.

Answer:

5. (12 points) Suppose $2x + y = 15$. Given this constraint, find the smallest possible value of $x^2 + y^2$.

Answer:

6. (12 points) Amber is building a rectangular pen. She wants to make the two sides that run in the east-west direction out of barbed wire, which costs 3 per foot. The other two sides will be chain-link fencing, which costs 5 per foot. Find the dimensions of the largest possible rectangular pen that can be built for 2400.

Answer:

7. (10 points) Draw a graph of $y = \frac{x}{x+3}$. Specify all intercepts and asymptotes. (Draw neatly. You may lose points for indecipherable answers.)

8. (6 points each) Solve the following equations.

(a) $3^{2x+1} = 27\sqrt{3}$

Answer:

(b) $x^2 10^x - 2x 10^x = -10^x$

Answer: