

MATHEMATICS 112 EXAM ONE October 10th, 2006

Name: _____

Instructor and section: _____

1. There are 11 problems on 10 pages (counting this page).
2. No graphing or programmable calculators are allowed. Scientific calculators are allowed but are not needed.
3. Give exact answers (fractions, square roots, etc.). Decimal approximations will not receive full credit.
4. **DO NOT SIMPLIFY** your answers unless specifically told to. Answers such as $x = \frac{3^2\sqrt{25} + 6}{12}$ are perfectly okay.
5. No notes or books are allowed.
6. Use only the scratch paper provided. Work appearing on your scratch paper will not be graded.
7. Show your work and make your methods clear. Unjustified answers will receive no credit.
8. Put your final answer in the box or on the line provided.

problem	possible score	your score
1	10	
2	10	
3	8	
4	6	
5	8	
6	8	
7	6	
8	10	
9	10	
10	12	
11	12	
TOTAL	100	

1. Consider this infinite sequence:

$$6, 3, 0, -3, -6, -9, -12, -15, \dots$$

(a) (4 points) Calculate the 41st term in this sequence.

Answer:

(b) (6 points) Find the sum of the first 41 terms of the sequence.

Answer:

2. (a) (4 points) Rewrite the following sum in sigma (summation) notation.

$$\frac{x^2}{2} + \frac{2x^4}{4} + \frac{3x^6}{8} + \frac{4x^8}{16} + \cdots + \frac{9x^{18}}{512}$$

Answer:

- (b) (6 points) Evaluate the following (infinite) sum:

$$\frac{2}{5} + \frac{6}{25} + \frac{18}{125} + \frac{54}{625} + \cdots$$

Answer:

3. (8 points) Two perpendicular lines intersect at the point $(3, 8)$. One of these lines has its x -intercept at $x = -1$. Find the equation of the other line.

Answer:

4. (6 points) Find all real number solutions to $|x^2 - 2| = 6$

Answer:

5. (8 points) Solve the inequality $15 - 3|1 - 2x| < 9$.

Answer:

6. (8 points) Solve this equation:

$$\sqrt{x+8} - 2 = x.$$

Answer:

7. (6 points) Find all real values for t that make $t^{-2} + 3t^{-1} - 4 = 0$.

Answer:

8. (a) (5 points) Write the equation of a circle with its center at the point $(3, 5)$ and a radius of 8.

Equation:

- (b) (5 points) Find the x -intercepts of this circle, if any.

Answer:

9. (10 points) A barrel contains sixty liters of a solution that is 20% ethanol and 80% gasoline. How many liters of pure ethanol need to be added to the barrel so that the resulting solution is 25% ethanol?

Answer:

10. (6 points each) Solve the following inequalities. Write your answers in interval notation.

(a) $-x(x^2 - 4)(x - 2) \geq 0$

Answer:

(b) $\frac{1}{3-x} \geq 1$

Answer:

11. (4 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) $\frac{1 - \frac{1}{a^2}}{\frac{1}{a} + 1} =$

Answer:

(b) $\left(x^{-2} + \frac{1}{x}\right)^{-1} =$

Answer:

(c) $\sqrt[3]{8x^3y^5 + 24x^3y^3} =$

Answer:

SCRATCH PAPER

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