MATHEMATICS 112 EXAM I Oct 6, 2005

Name: _____

Instructor and section: _____

1. **There are 9 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** $x = \dfrac{3^2\sqrt{25}+6}{12}$ **are perfectly okay.**
   Answers such as $3x + 4 = 7x - 2$ **require more simplification.**
5. **No notes or books are allowed.**
6. **Use only the scratch paper provided.**
7. **Show your work and make your methods clear. Unjustified answers will receive no credit.**
8. **Put your final answer in the box.**

problem	possible score	your score
1	10	
2	12	
3	14	
4	9	
5	12	
6	7	
7	11	
8	10	
9	15	
TOTAL	100	

1. Find the sum.
   a) (5 points)

$$\sum_{i=3}^{3000} 4 - 2i$$

Answer:

b) (5 points)

$$7 - \frac{7}{\pi} + \frac{7}{\pi^2} - \frac{7}{\pi^3} + \dots$$

Answer:

2. a) (7 points) In a geometric sequence the second term is 3 and the sixth term is 12. What is the first term?

Answer:

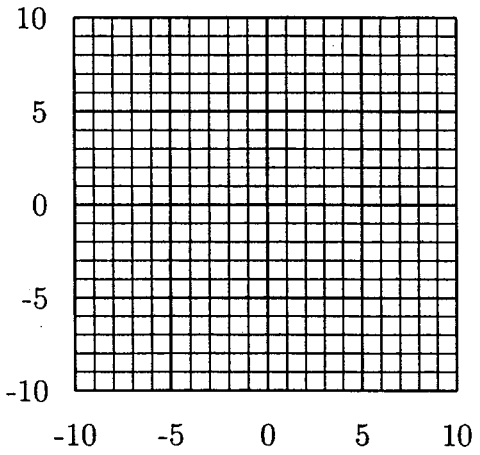
b) (5 points) Solve for x.

$$2 - \sqrt{10 - x} = -x$$

Answer:

3. For the following problems let $P = (1, 2)$ and $Q = (3, 6)$.

a) (4 points) Graph the line segment joining points P and Q, then reflect this line over the origin. Next to the graph, write the coordinates of the endpoints of the reflection.



b) (3 points) What is the equation of the line connecting P and Q?

Answer:

c) (2 points) What is the distance from P to Q?

Answer:

d) (5 points) Assume P and Q are the endpoints of a diagonal of a **square**. Use the pythagorean theorem to determine the perimeter of the square. **Be careful!** The answer is not 12.

Answer:

4. (9 points) The speed of an eastbound train is 5 mph faster than that of a westbound train. If the trains leave at the same time from stations 620 miles apart and pass each other after 6 hours, find the speed of the eastbound train.

Answer:

5. Solve for x.

a) (6 points) Put your answer in interval notation.

$$|x+4| \geq 2$$

Answer:

b) (6 points)

$$x^{-2} - 7x^{-1} + 10 = 0$$

Answer:

6. (7 points) What is the center and radius of the following circle?

$$2x^2 + 8x + 2y^2 + 12y - 2 = 0$$

Answer:

7. a) (6 points) Find the equation of a quadratic with roots

$$r_1 = \frac{1+\sqrt{5}}{2}, \qquad r_2 = \frac{1-\sqrt{5}}{2}.$$

Put your answer in the form $x^2 + bx + c = 0$.

Answer:

b) (5 points) Solve for x.

$$\frac{2x-1}{\pi^2 x + 1} = 1$$

Answer:

8. a) (6 points) Find the line perpendicular to $2y + 3x - 4 = 0$ and passing through (7,0).

Answer:

b) (4 points) What are the x and y intercepts of $2y + 3x - 4 = 0$.

Answer:

9. (5 points each) Simplify as much as possible the following (answers on this page will receive either full credit or no credit):

a) $\dfrac{(ab-a)^2}{a(a^2-b^2)}$

Answer:

b) $\sqrt{4a^2b^2+16a^4b^4}$

Answer:

c) $\dfrac{\frac{1}{x-h}-\frac{1}{x}}{h}$

Answer:

Scratch Paper