MATHEMATICS 112   FINAL EXAM (Make up)   Dec 19th, 2007

Name: _____

Instructor and section: _____

1. There are 14 problems on 15 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 $x = \dfrac{3^2\sqrt{25} + 6}{12}$ 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	20	
2	20	
3	24	
4	22	
5	20	
6	20	
7	20	
8	20	
9	20	
10	20	
11	20	
12	20	
13	24	
14	20	
TOTAL	300	

1. (10 points each) Simplify each of the following expressions as much as possible.

   (a) $\dfrac{x^{-2} - y^{-2}}{x^{-1} + y^{-1}}$

<blockquote>
.
Answer:
</blockquote>

   (b) $\sqrt[5]{\dfrac{5^{15} a^{35}}{32}}$

<blockquote>
.
Answer:
</blockquote>

2. (10 points each)

   (a) Simplify $\log_5 \left(\dfrac{1}{625} \right)$

<blockquote>
.
Answer:
</blockquote>

   (b) Simplify $\log_3 (27\sqrt{3})$

<blockquote>
.
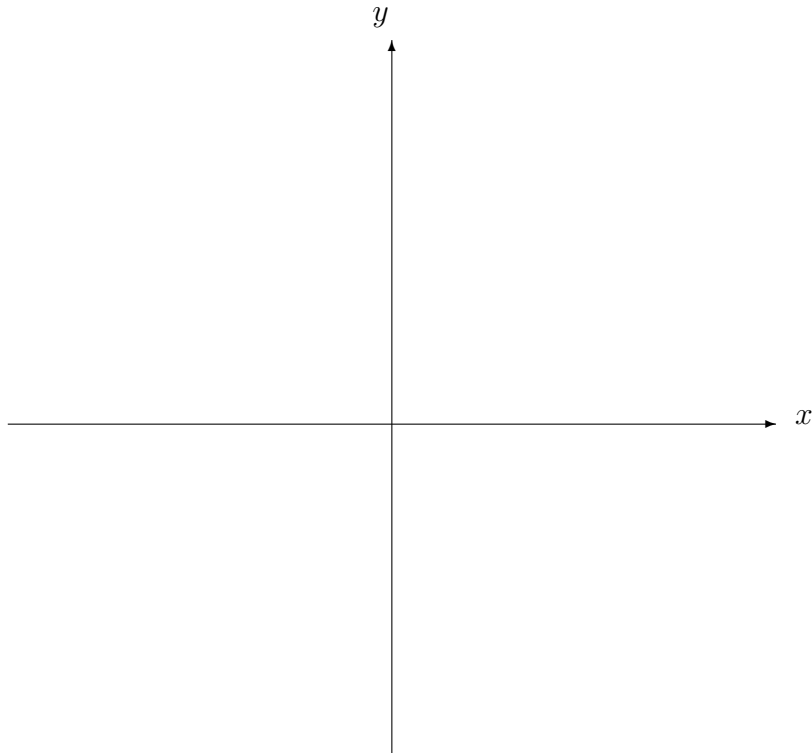Answer:
</blockquote>

3. (12 points each)

   (a) Find all points where the graph of $y = x - 2$ intersects the graph of $y = x^2 - 4$

<blockquote>
.
Answer:
</blockquote>

(b) Graph $y = x - 2$ and $y = 4 - x^2$ on the axes below.

4. (22 points) The half-life of Sodium-24 is 15 hours. Find the time required for 75% of a sample of Sodium-24 to decay. (Hint: If 75% has decayed, then 25% remains.)

> Answer:

5. (20 points) Find the minimum distance between the point $(4, 0)$ and the graph $y = \sqrt{x}$

> Answer:

6. (20 points) Find a polynomial $p(x)$ which has root 0 of multiplicity 2, root $1 - i$ of multiplicity 1 and root $1 + i$ of multiplicity 1, such that $p(1) = 2$

7. (10 points each)

   (a) Expand $(a + b)^4 =$

   > Answer:

   (b) Expand and simplify each term $(\sqrt{x} - \sqrt{y})^4$

   > Answer:

8. (10 points each) Let $a_1 = 5$ and $a_{n+1} = 2a_n$

(a) Write the first 4 terms of this sequence

.
Answer:

(b) Find the sum of the first 100 terms of this sequence. You do not need simplify your answer.

.
Answer:

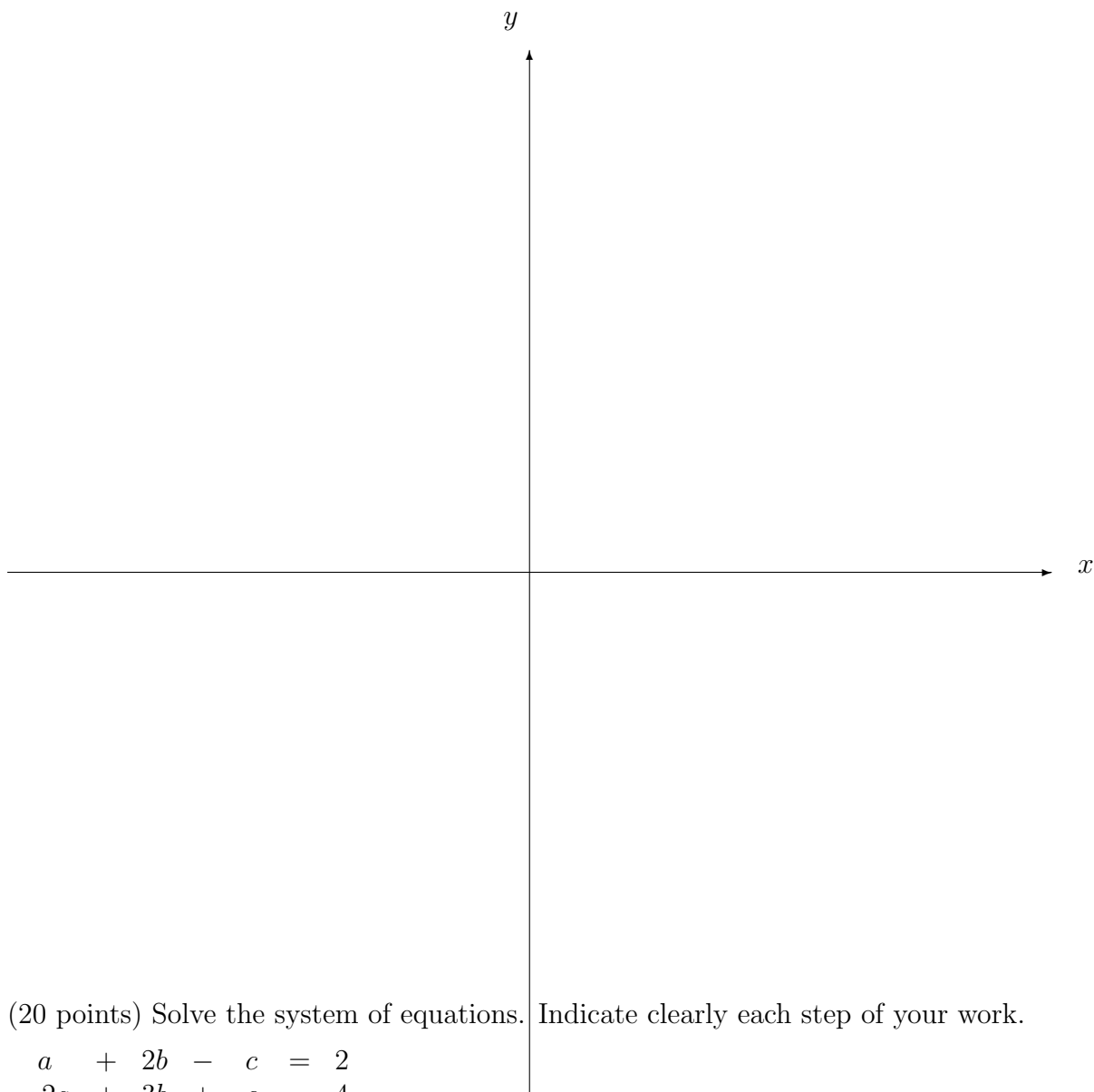9. (10 points each) In this problem, let $g(x) = \sqrt{x} - 2$ and $f(x) = 2x + 4$.

(a) Find a formula for f^{-1}

.
Answer:

(b) Find the domain of $g[f(x)]$. Write your answer in interval notation

.
Answer:

10. (20 points) Draw a graph of $y = 2^x - 4$. Find all intercepts and asymptotes. On the graph label each point with its coordinates, and each asymptote with its equation.
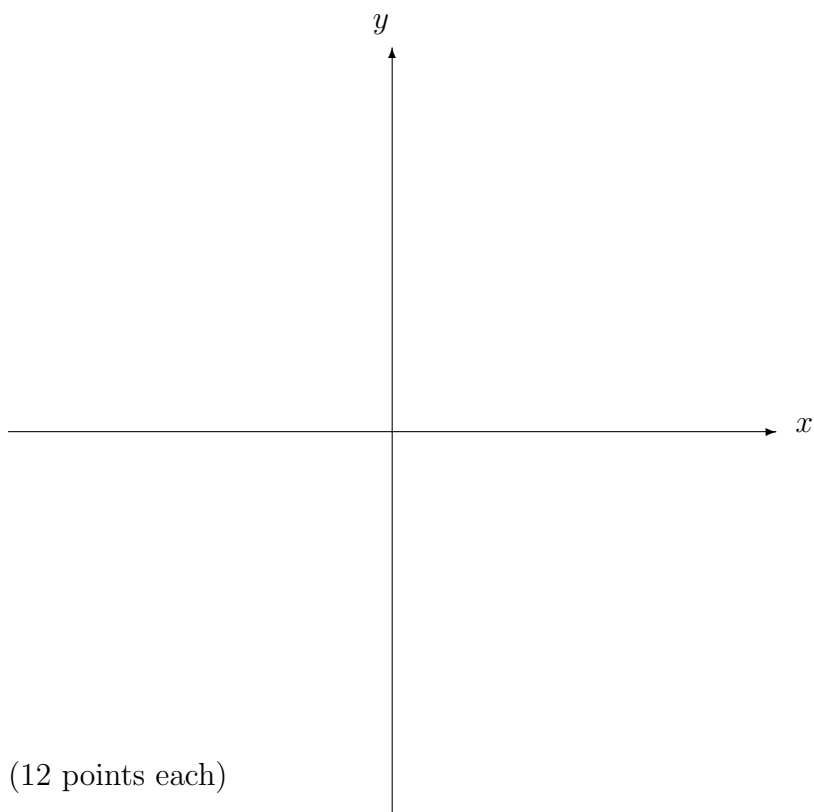

11. (20 points) Solve the system of equations. Indicate clearly each step of your work.

$$
\begin{array}{rcrcrcl}
a & + & 2b & - & c & = & 2 \\
-2a & + & 3b & + & c & = & 4 \\
3a & - & b & - & 4c & = & 6
\end{array}
$$

$a =$ $b =$ $c =$

12. (20 points) Graph $y = (x^2 + 2x - 3)(x^2 - 1)$. List each zero with its multiplicity. Label any intercepts on the graph with their coordinates.

Zeros:

13. (12 points each)

    (a) Find the remainder when $2x^3 + 2kx + 4$ is divided by $x + 2$.

    Answer:

    (b) Determine the value of k such that $x + 2$ is a factor of $2x^3 + 2kx + 4$

    Answer:

14. (20 points) Find all real number solutions to the system of equations:

$$w = \log_3(2 - t)$$
$$w = 3 - \log_3(-4 - t)$$

$t =$ $\qquad$ $w =$

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  grade          range          count      percent
   A          240 ... 290         74         17%
   AB         240 ... 239          0          0%
   B          185 ... 239        182         42%
   BC         185 ... 184          0          0%
   C          140 ... 184         98         22%
   D          110 ... 139         40          9%
   F            0 ... 109         42         10%
There are 436 scores.
Mean score = 186.44999999999. Mean grade = 2.4700000000000002.
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