

Your Name: _____

Instructor: _____

April 10, 2003

- There are 10 problems on the exam.
- No graphing or programmable calculators are allowed. Scientific calculators are allowed but are not needed.
- Give exact answers (fractions, square roots, etc.). Decimal approximations may not receive full credit.
- Please do not simplify unless explicitly told to. Answers such as $x = \frac{3^2\sqrt{25+6}}{12}$ are okay. Answers such as $3x + 4 = 7x - 2$ require more simplification.
- No notes or books are allowed.
- Use only the scratch paper provided
- Show your works and make your methods clear. Unjustified answer will receive no credit.
- Please CIRCLE your final answer

Problem	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
TOTAL	100	

1) Let $f(x) = \frac{x+2}{3x+7}$. Find the domain of f , the range of f and write a formula for $f^{-1}(x)$.

2) Let $f(x) = -2x^2(x + 1)(x - 1)$. Sketch a graph.

3) Consider the following equation: $3^{2x} = 9\sqrt{3}$

(a) Solve the equation using a logarithm of your choice.

(b) Solve the equation without using a logarithm. Are the answers the same?

✓

4) Let $f(x) = \sqrt{x+1}$ and $g(x) = x^2 - 1$.

(a) Find $f(g(x))$ and specify the domain.

(b) Find $g(f(x))$ and specify the domain.

5) Let $f(x) = \frac{x+1}{x^2-16}$. Sketch a graph.

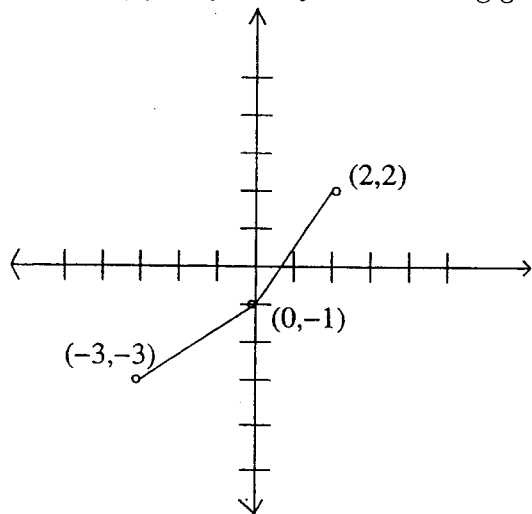
6) It is well known that $0^{\circ}C = 32^{\circ}F$ and $100^{\circ}C = 212^{\circ}F$ and assume that y is the measurement of a given temperature in $^{\circ}C$ and x is the measurement of the same temperature in $^{\circ}F$. Also assume that y is a linear function of x .

(a) Find the equation for y as a function of x .

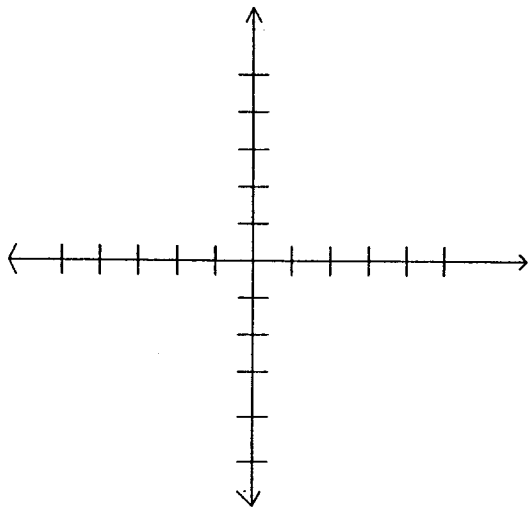
(b) Which is colder, $-45^{\circ}C$ or $-45^{\circ}F$?

(c) For what value of z is $z^{\circ}C = z^{\circ}F$?

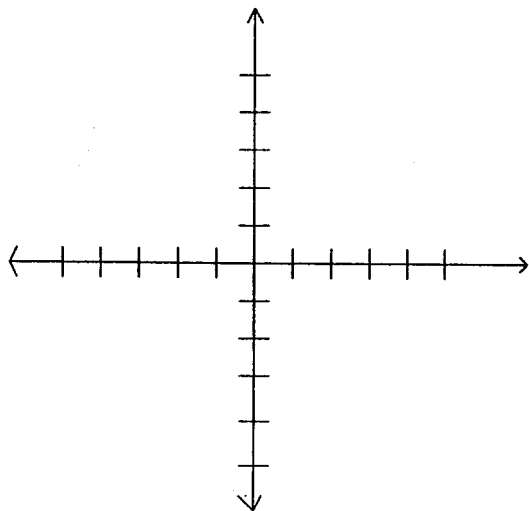
7) Let $f(x)$ be given by the following graph:



(a) Graph $f^{-1}(x - 1)$. Be sure to label your vertices.



(b) Graph $f(-x + 1)$. Be sure to label your vertices.

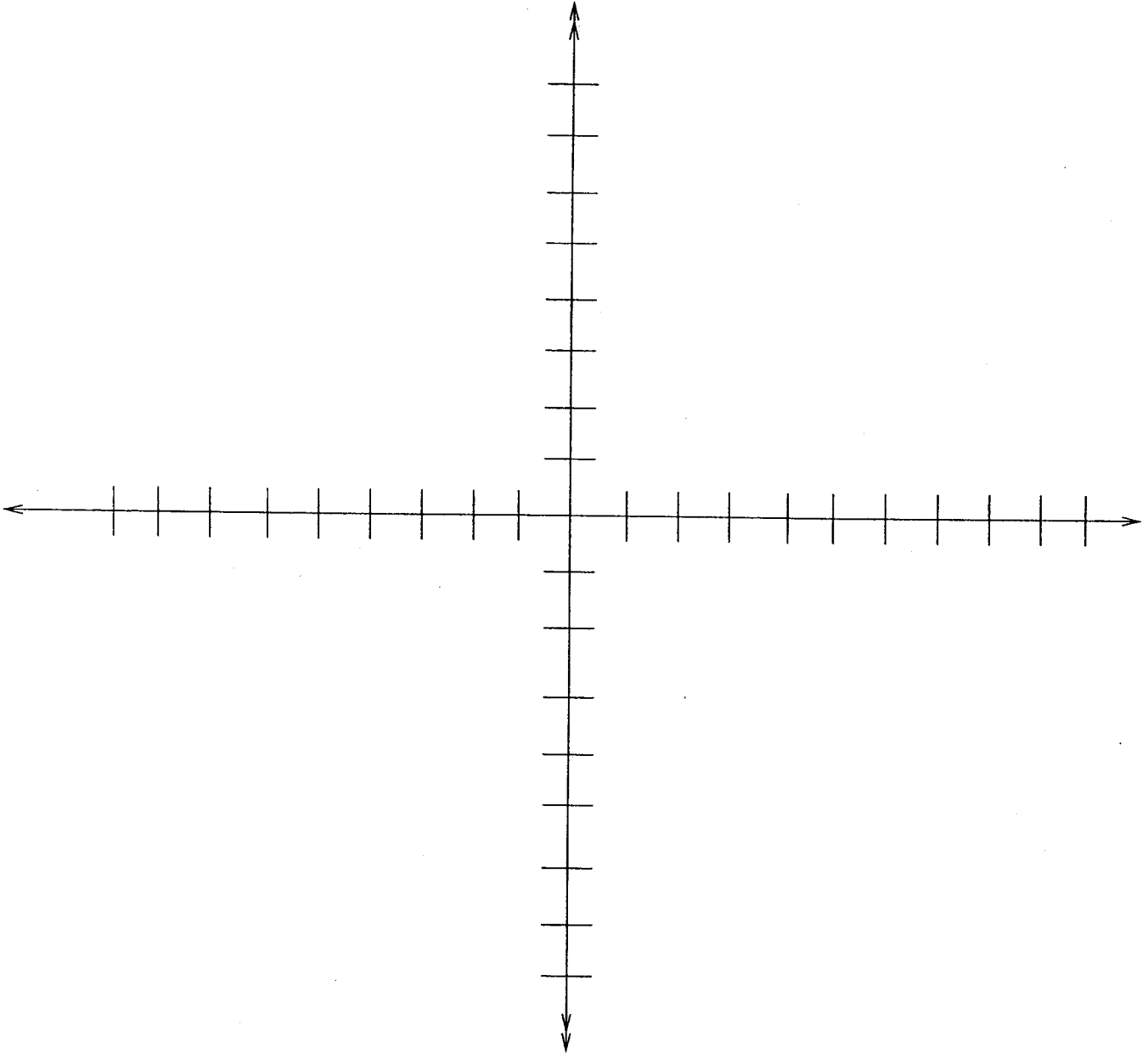


8) Graph the following on the same set of axes and label them clearly.

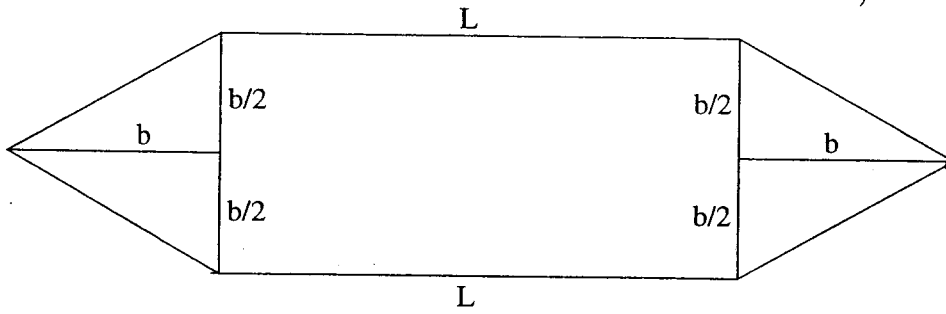
(a) $y = 2^x$

(b) $y = \frac{1}{2^x}$

(c) $y = 3^x$



9) Asher's Construction Company wants to build a fence with a configuration given by the following picture. The height of the triangles on the end are equal to the base of the triangle. Find the value of b that maximizes the enclosed area given that the perimeter of the fence is 100ft. (Note: there are six sides to the fence: the top, the bottom, and 2 slanted sides on each end)



10) Simplify the following:

(a)

$$\sqrt{x^4y^2 + x^7y^3 + 4x^2}$$

(b)

$$1 + 3(x^2 - 5x - 4) - [1 - (15x - 3x^2)]$$

(c)

$$\frac{\sqrt{x+a}}{\sqrt{x-a}} - \frac{\sqrt{x-a}}{\sqrt{x+a}}$$

(d)

$$(x^2 + x^{-2})^{-1}$$

(e)

$$\sqrt[3]{\sqrt{x}} + \sqrt{\sqrt[3]{x}} - 6x^{\frac{1}{6}}$$