Simon Fraser University
Math 100

Midterm 1- Exam 1

Date: October 3, 2007
Time: 11:30 - 12:20am

Last Name (print): Solutions **First Name** _____

Signature: _____ **SFU Email ID:** _____

Instructor: Laura Chávez Lomelí.

Instructions:

1. Do not open this exam until instructed to do so.
2. **No calculators, notes or books are allowed.**
3. When presenting a final answer for your solution, calculator-ready expressions will be given full credit.
4. Show all your work. **No credit** will be given for an answer without the correct accompanying work.
5. Answer the questions in the space provided. Continue on the back of the previous page if necessary.

Question	Mark	Maximum
1		10
2		10
3		12
4		8
5		5
Total		45

1. This question refers to the points $A(-1,6), B(-3,-5)$ and $C(3,3)$

[2 pts] (a) Find the midpoint P of the segment with endpoints A and B

$$P = \left(\frac{-1-3}{2}, \frac{6-5}{2}\right) = \left(-2, \frac{1}{2}\right)$$

[2 pts] (b) Determine the distance between A and B

$$d(A,B) = \sqrt{(-1+3)^2 + (6-(-5))^2}$$
$$= \sqrt{2^2 + 11^2} = \sqrt{125}.$$

[4 pts] (c) Give the equation of the circle with center at C and passing through the origin $(0,0)$.

$$r = d(C,(0,0)) = \sqrt{3^2+3^2} = \sqrt{18}$$

Eqn. of circle:

$$(x-3)^2 + (y-3)^2 = 18$$

[2 pts] (d) The distance from A to C is 5 and the distance from B to C is 10. Are the points A, B and C the vertices of a right triangle? Answer Yes, No. Explain.

Yes.

$$d^2(A,C) + d^2(B,C) = d^2(B,C)$$

$$25 + 100 = 125.$$

2. This question deals with lines and their equations.

[2 pts] (a) Find the equation of the line L with slope $m = 3$ and y-intercept $(0, 6)$.

$y = 3x + 6$

[2 pts] (b) Determine the x-intercept of L.

We want $y = 0$ $\quad 0 = 3x + 6$

$3x = -6$

$x = -2$ $\quad (-2, 0)$

[3 pts] (c) Find the equation of the line L_2 perpendicular to L passing through the point $(-9, 6)$.

The slope of L_2 is $m_2 = -\frac{1}{3}$. We get:

$y - 6 = -\frac{1}{3}(x + 9)$

$y = -\frac{1}{3}x - 3 + 6$

$y = -\frac{1}{3}x + 3$

[3 pts] (d) Find the intersection of the lines L and L_2.

We must have $3x + 6 = -\frac{1}{3}x + 3$

$3x + \frac{1}{3}x = 3 - 6$

$x(3 + \frac{1}{3}) = -3$

$\frac{10x}{3} = -3$

$x = -\frac{9}{10}$

$y = 3(-\frac{9}{10}) + 6$

$= -\frac{27 + 60}{10}$

$y = \frac{33}{10}$

3. Consider the functions $f(x) = \sqrt{x-2}$ and $g(x) = 2x^2 - 30$.

[4 pts] (a) Find the equation of $f^{-1}(x)$.

$y = \sqrt{x-2}$

$y^2 = x - 2$

$y^2 + 2 = x$

Swap x & y : $y = x^2 + 2$

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

[4 pts] (b) Find an expression for $(f \circ g)(x)$. Simplify.

$(f \circ g)(x) = f(g(x)) = f(2x^2 - 30)$

$= \sqrt{2x^2 - 30 - 2}$

$= \sqrt{2x^2 - 32}$

[4 pts] (c) Determine the domain of $(f \circ g)(x)$

We must have:

$2x^2 - 32 \geq 0$

$2(x^2 - 16) \geq 0$

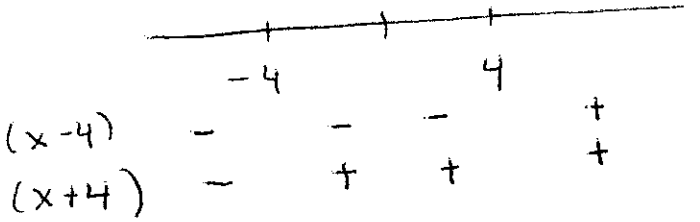
$2(x-4)(x+4) \geq 0$

or

$x^2 - 16 \geq 0$

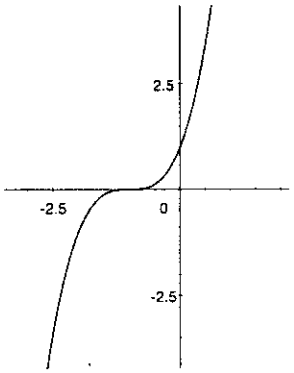
$x^2 \geq 16$

$|x| \geq 4$



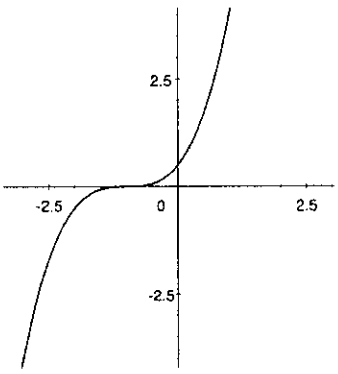
$(-\infty, 4] \cup [4, \infty)$

[8 pts] 4. The following graph is the graph of the function $f(x)$.

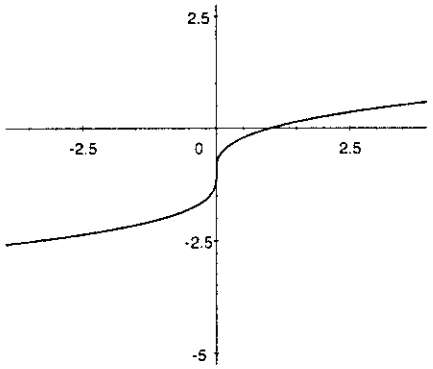


Identify the following graphs by matching each of them to the correct function.

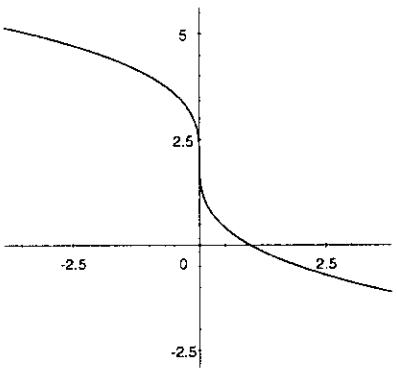
(A) $f^{-1}(x)$ (B) $-f(x)+2$ (C) $-2f^{-1}(x)$ (D) $\frac{1}{2}f(x)$



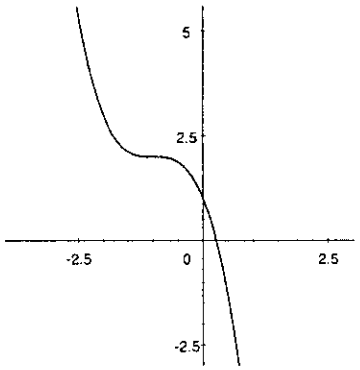
[D]



[A]



[C]



[B]