

**King Fahd University of Petroleum and Minerals
College of Sciences, Prep-Year Math Program**

Code 3

Math 001, Exam II

(Term 012)

Sunday, April 28, 2002

6:30-8:20 p.m.

Code 3

Student's Name: _____

ID #: _____ Section #: _____

This exam consists of Three parts

Part I: True of False, write your answer in the assigned place on page 1.

Part II: Multiple Choice, write your answer in the assigned place on page 2.

Part III: Written Questions, you must show all necessary steps for full mark.

No Calculators, Pagers, or Mobiles are allowed during this exam.

Question	Points	Student's Score
Part I: (1 - 10)	10	
Part II: (1 - 5)	10	
Part III: 1(a),(b)	10	
2	6	
3	5	
4	4	
5 (a), (b), (c)	8	
6	5	
7 (a), (b),(c),(d),(e)	14	
8 (a), (b),(c),(d)	8	
9	3	
10 (a), (b),(c)	6	
11 (a), (b)	6	
12	5	

Total	
	100

Part I: True or False Questions (1 point each)

Write TRUE or FALSE for the following statements.

- 1) The graphs of the functions f and f^{-1} are symmetric with respect to the line $y = x$ -----
- 2) The range of the function $f(x) = -x^2$ is $(-\infty, \infty)$ -----
- 3) If $\sqrt{a} + \sqrt{b} = c$, then $a + b = c^2$ -----
- 4) If $a < b$, then $-a > -b$ -----
- 5) If $|x - 3| \geq 0$, then x is any real number. -----
- 6) If the point (a, b) is in the first quadrant and the point (c, d) is in the third quadrant, then -----
the point (ac, bd) is in the first quadrant.
- 7) $x^2 + y^2 = 1$ defines y as a function of x -----
- 8) $[-\pi] = -4$ -----
- 9) The range of the function $y = [x]$ is the set of integers. -----
- 10) If the lines $y = mx + b$ and $y = kx + c$ are perpendicular, then $m = k$ -----

Part II: Multiple Choice Questions (2 points each)

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- 1) If the inverse function $f^{-1}(x)$ of $f(x)$ exists, then which one of the following statements is always TRUE?
- f is an even function.
 - f is an odd function.
 - f is a one-to-one function.
 - f is a linear function.
- 2) Which one of the following sets of the ordered pairs defines a function?
- $\{(5,10), (3,-2), (4,7), (5,8)\}$
 - $\{(1,0), (2,0), (3,0), (4,1)\}$
 - $\{(-7,0), (3,-2), (5,0), (-7,2)\}$
 - $\{(-3,0), (1,-2), (4,1), (-3,2)\}$
- 3) Which one of the following statements is FALSE?
- If $|x| = a, (a > 0)$, then $x = a$ or $x = -a$
 - If $|A| \leq k, (k > 0)$, then $A \leq k$ and $-k \leq A$
 - $|x + a| = |x| + |a|$ for all real numbers x and a
 - $x \leq |x|$ for all real numbers.
- 4) The inequality $(x + 2)(x - 1) < 4$ is equivalent to
- $(x + 3)(x - 2) < 0$
 - $x + 2 < 4$ and $x - 1 < 4$
 - $x + 2 < 4$ or $x - 1 < 4$
 - $x + 2 < \frac{4}{x - 1}$
- 5) Which one of the following statements is TRUE?
- $x < y$ and $x + c < y + c$ are equivalent inequalities.
 - If $a < b$, then $a^2 < b^2$ for all real numbers a and b .
 - If $a < b$, then $ca < cb$ and $\frac{a}{c} < \frac{b}{c}$ for all nonzero real numbers.
 - $\frac{1}{x} < x$ for all real numbers.

Part III: Written (Show all necessary steps for full credit)

1) Solve the following equations

a) $\sqrt{x-1} - \sqrt{x-4} = 1$ (5 points)

b) $x^4 + 3x^3 - 8x - 24 = 0$ (5 points)

2) Solve the inequality $\frac{1}{x^2 + 4x - 5} \leq \frac{3}{x+5}$ (6 points)

3) Find the solution of the inequality $1 < |x + 1| < 2$. Write your answer in interval notation. (5 points)

4) Solve the absolute value equation. (4 points)

$$\left| \frac{3x-4}{5} \right| - \frac{7}{5} = -1$$

5) Given the equation of a circle $x^2 + y^2 - 6x - 4y + 12 = 0$

a) Find the standard form of this equation. (4 points)

b) Find the center and the radius. (2 points)

c) If a diameter of this circle has one end point (4,2), then what is the other end point? (2 points)

6) Find the equation of a line, which is parallel to the line $2x + 3y = 4$ and passing through the point (-1, 2).
Write your answer in the form $y = mx + b$ (5 points)

7) Answer the following questions about the graph of a function given in Figure A.

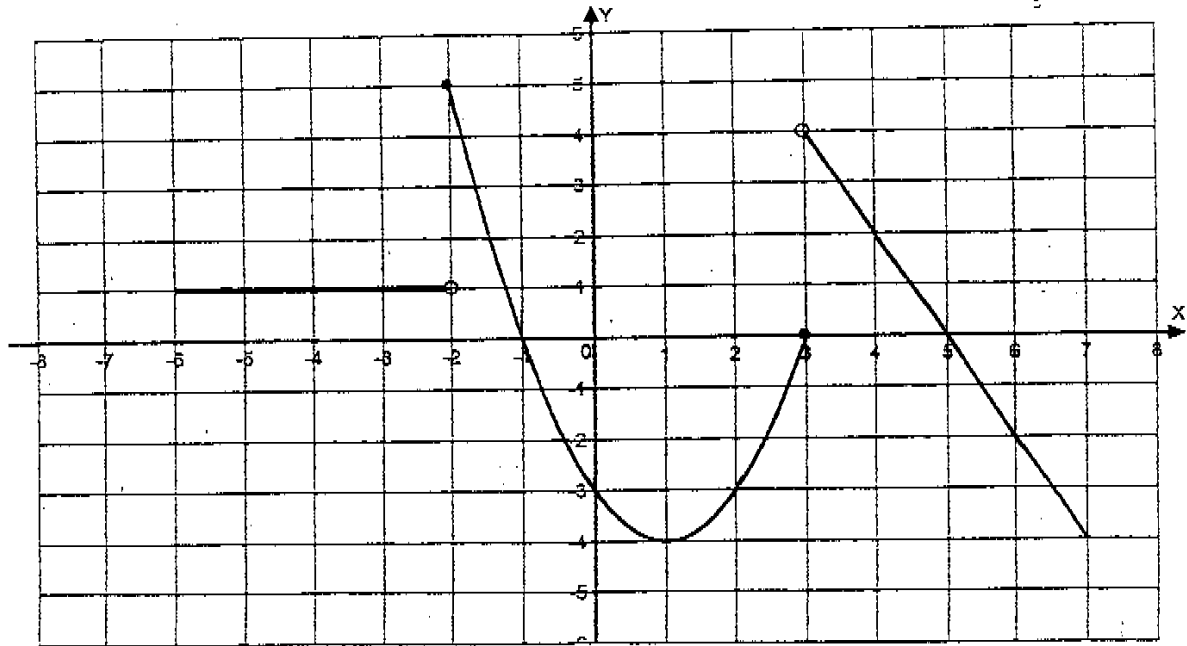


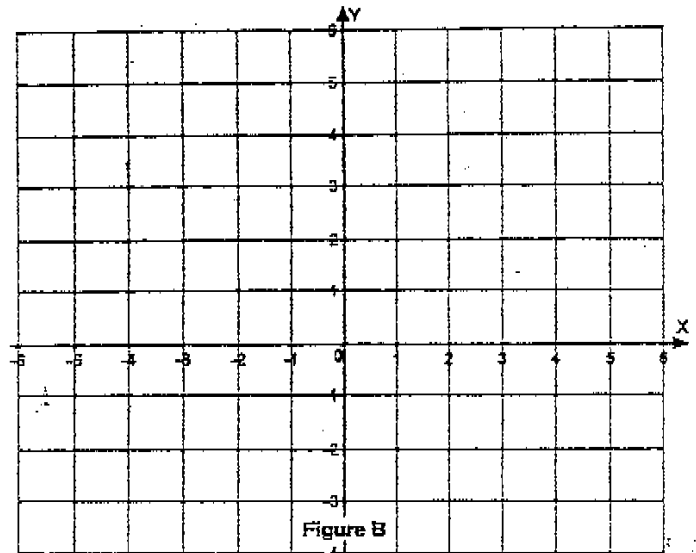
Figure A

- Find the x -intercepts (3 points)
- Find the intervals where the function is decreasing. (4 points)
- Find the intervals where the function is constant. (2 points)
- Find the intervals where the function is increasing. (2 points)
- Evaluate $f(-2) - f(3) + f(7)$ (3 points)

8) For the quadratic function $y = -x^2 - 2x + 3$;

a) Find the standard form of the function. (2 points)

b) Find the vertex and axis of symmetry. (2 points)



c) Find the maximum or minimum value of this function. (1 point)

d) Sketch the graph of the function in the Figure B (3 points)

9) Find the domain of the function $f(x) = \sqrt{x^2 - 4}$ (3 points)

10) Fill in the spaces with the words ' Even, Odd, Neither even nor odd'

a) $f(x) = \sqrt{3-x^2}$ is _____function (2 points)

b) $g(x) = \frac{x^3}{x^2+1}$ is _____function (2 points)

c) $y(x) = 2+x+x^2$ is _____function (2 points)

11) For the given functions $f(x) = \frac{3}{|5-x|}$ and $g(x) = -\frac{2}{x}$ find:

a) $(f \circ g)(x)$ (3 points)

b) $(f \circ g)\left(\frac{-4}{11}\right)$ (3 points)

12) Find the inverse of $f(x) = \frac{2-3x}{5x+3}$ (5 points)