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

Code 002

Math 001, Final Exam
Term (001)
Wednesday, January 10, 2001
12:30 - 2:45 p.m.

Code 002

STUDENT NAME:_____

ID #:_____ SECTION #:_____

Important Instructions

Use only 6 **Digits I.D. # :** i.e. Remove two zeros from 2000 of your ID#
(Example: ID# 20006587 should be bubbled as 206587)

Do not put any mark on a choice of any answer on the Exam Paper

1. All types of **Calculators, Pagers or Telephones are not allowed** during the examination.
2. **Use an HB 2.5 pencil.** Any mistake in bubbling your ID number will cost you one grade point.
3. Use a good eraser. **Do not use the eraser attached to the pencil.**
4. **Write your name, ID number and Mathematics Section number** on the examination paper and in the upper left corner of the answer sheet.
5. When bubbling **your ID number and Math Section number**, be sure that bubbles match with the number that you write.
6. The **test Code Number** is already typed and bubbled in your answer sheet. Make sure that it is **the same as that printed on your question paper.**
7. When erasing a bubble, make sure that you **do not leave any trace of pencilling.**
8. **Check** that the exam paper has 26 questions.

1. One factor of the expression $64 + (x-3)^3$ is:

(a) $x^2 - 2x + 13$

(b) $x^2 - 10x + 37$

(c) $x^2 - 6x + 37$

(d) $x^2 - 10x + 13$

(e) $x^2 + 6x + 37$

2. Which one of the following statements is TRUE?

(a) The y-intercept of line $3x - 4y = -20$ is -5.

(b) The line $6y = -5x$ does not pass through the origin.

(c) The midpoint of $(2a+1, 2b-1)$ and $(1, -1)$ is (a, b).

(d) The slope of a horizontal line is undefined.

(e) The points $(-2, 6), (8, 0)$ and $(18, -6)$ lie on the same line.

3. If the distance between the center of the circle $x^2 + y^2 - 2y = 5$ and the vertex of the parabola $x = -5y^2 + m$ is $\sqrt{10}$, then m is equal to:

(a) ± 3

(b) ± 10

(c) ± 8

(d) ± 7

(e) ± 5

4. The vertices and the equations of the asymptotes of the hyperbola $4x^2 - 9y^2 = 36$, respectively, are:

(a) $(0, \pm 3)$, $y = \pm \frac{3}{2}x$

(b) $(\pm 2, 0)$, $y = \pm \frac{3}{2}x$

(c) $(0, \pm 2)$, $y = \pm \frac{2}{3}x$

(d) $(\pm 3, 0)$, $y = \pm \frac{2}{3}x$

(e) $(9, 4)$, $y = \pm \frac{4}{9}x$

5. The graph of the equation $12x^2 + 72x + 72 = 9y^2 + 72y$ represents:

(a) an ellipse with center $(3, 4)$

(b) an ellipse with center $(-3, -4)$

(c) a hyperbola with center $(-3, -4)$

(d) a hyperbola with center $(3, 4)$

(e) a parabola with vertex $(3, 4)$

6. The remainder is zero when $P(x) = x^7 + 30x^2 + K$ is divided by $x + 2$, then K is equal to:

(a) 248

(b) 28

(c) 68

(d) 78

(e) 8

7. If the discriminant of the quadratic equation

$$x^2 + 4kx - 5 = x$$

is 29 then k is equal to:

(a) 1 or $-\frac{1}{2}$

(b) -1 or 2

(c) 1 only

(d) -1 only

(e) 1 or $-\frac{1}{4}$

8. The sum of the solutions of $\frac{9}{(r-2)^2} = \frac{11}{r-2} - 2$ is:

(a) $\frac{13}{5}$

(b) $\frac{7}{2}$

(c) $\frac{12}{7}$

(d) $\frac{11}{5}$

(e) $\frac{19}{2}$

9. If $g(x) = x^2 - 1$ and $f(x) = \sqrt{x-1}$, then the composition function $g \circ f$ and the domain D are given by:

(a) $(g \circ f)(x) = x - 2, \quad D = (-\infty, \infty)$

(b) $(g \circ f)(x) = x - 2, \quad D = [1, \infty)$

(c) $(g \circ f)(x) = x, \quad D = (-\infty, \infty)$

(d) $(g \circ f)(x) = \sqrt{x^2 - 2}, \quad D = (-\infty, -\sqrt{2}] \cup [\sqrt{2}, \infty)$

(e) $(g \circ f)(x) = \sqrt{x^2 - 2}, \quad D = [1, \infty)$

10. If the line $\frac{1}{2}kx + 3y - 7 = 0$ is perpendicular to the line passing through $\left(1, -\frac{1}{2}\right)$ and $(-2, -5)$ then k is equal to:

(a) -1

(b) $\frac{1}{2}$

(c) $\frac{3}{4}$

(d) 4

(e) -3

11. If the graph of $y = 2x^2 + 3x - 1$ is translated 1 unit to the left and 3 units upward, then the equation of the new graph is:

(a) $y = 2x^2 - x - 5$

(b) $y = 2x^2 + 7x + 7$

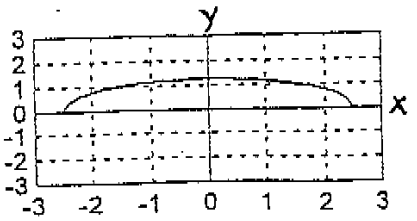
(c) $y = 2x^2 + 6x - 5$

(d) $y = 2x^2 + 5x - 4$

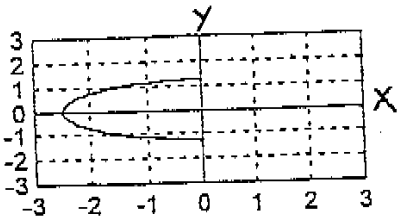
(e) $y = 2x^2 + 3x + 5$

12. The graph of $x = \dfrac{\sqrt{25 - 16y^2}}{2}$ is:

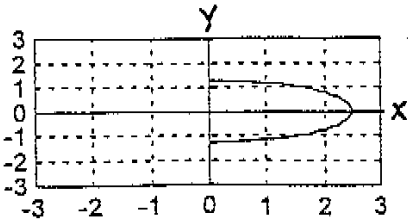
a)



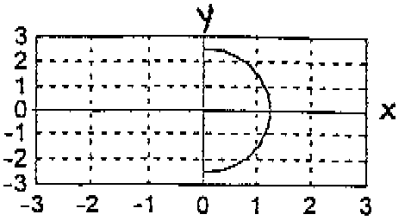
b)



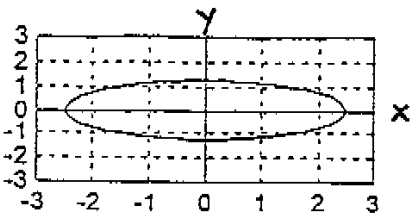
c)



d)



e)



13. If $1 < x < 2$ then $\left|\dfrac{x-6}{|x-1|+|x-2|}\right|$ is equal to:

(a) $x-6$

(b) $\dfrac{x-6}{2x-3}$

(c) $\dfrac{x-6}{3-2x}$

(d) $\dfrac{x+6}{2x+3}$

(e) $6-x$

14. If the shorter sides of a right triangle have lengths K and $2K+2$ and if the hypotenuse has length $K+8$, then the value of $3K+1$ is equal to:

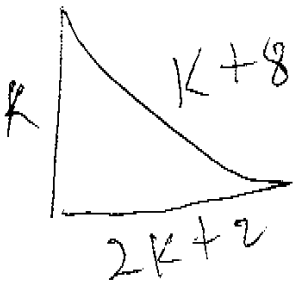
(a) 10

(b) 46

(c) 16

(d) 4

(e) -8



$(K+8)^2 = K^2 + 2K + 2$

15. The expression $\left(x-1-\frac{6}{x}\right) \div \left(1+\frac{2}{x}-\frac{15}{x^2}\right)$ simplifies to:

(a) $\frac{x(x+2)}{(x+5)}$

(b) $\frac{x+5}{x+2}$

(c) $\frac{x+2}{x+5}$

(d) $\frac{5}{2}$

(e) $\frac{x(x+5)}{(x+2)}$

16. The expression $\frac{\sqrt{3}+2\sqrt{2}}{3\sqrt{2}+2\sqrt{3}}$ is equal to:

(a) 1

(b) $\sqrt{6}$

(c) $1-\frac{\sqrt{6}}{6}$

(d) $\frac{\sqrt{6}}{6}$

(e) 6

17. If $1-i$ is a zero of $x^4-7x^3+18x^2-22x+A$ then A is equal to:

(a) -12

(b) 12

(c) $\frac{1}{12}$

(d) 0

(e) $-\frac{1}{12}$

18. One of the x-intercepts of the graph of the function $f(x)=3x^2+Kx-4$ is 4. Then the second x-intercept is equal to:

(a) -4

(b) 11

(c) -11

(d) $-\frac{1}{3}$

(e) $\frac{1}{3}$

19. If a rock is thrown upward from the ground with an initial velocity of 48 feet per second, the distance S in feet of the rock from the ground after t seconds is $S = 48t - 16t^2$. The maximum height the rock can reach is:

(a) 36 feet

(b) 24 feet

(c) 48 feet

(d) 16 feet

(e) 52 feet

20. If $a = 3$ and $b = -5$ then $\dfrac{b - a\left(2 - \dfrac{b-3}{b-7}\right)}{(b-a)\left(\dfrac{4a}{-b-1}\right)}$ is equal to:

(a) $-\dfrac{9}{16}$

(b) $-\dfrac{4}{9}$

(c) $\dfrac{3}{8}$

(d) 1

(e) -1

21. If $z = \left(\frac{i}{1-i}\right)^2$, then $z + \overline{z} =$

(a) $-\frac{1}{2}$

(b) 0

(c) $\frac{1}{2}$

(d) 2

(e) -2

22. The solution set of the inequality $4x^3 + 7x^2 \geq 2x$, in interval notation, is:

(a) $[-2, 0] \cup \left(\frac{1}{4}, +\infty\right)$

(b) $(-\infty, -2] \cup \left[0, \frac{1}{4}\right]$

(c) $(-\infty, +\infty)$

(d) $(-\infty, -2] \cup [0, +\infty)$

(e) $[-2, 0] \cup \left[\frac{1}{4}, +\infty\right)$

23. The domain D and the range R of the function $y = |x + 2| - 1$ are given by:

(a) $D = [0, +\infty)$, $R = [1, +\infty)$

(b) $D = [-2, +\infty)$, $R = [1, +\infty)$

(c) $D = (-2, +\infty)$, $R = [-1, +\infty)$

(d) $D = (-\infty, +\infty)$, $R = [-1, +\infty)$

(e) $D = (-\infty, -2) \cup (-2, +\infty)$, $R = (-\infty, -1]$

24. Which one of the following pairs of functions are inverse of each other?

(a) $f(x) = x^3 - 2$; $g(x) = \sqrt[3]{x + 2}$

(b) $f(x) = x^2$; $g(x) = \sqrt{x}$

(c) $f(x) = \dfrac{x}{x - 1}$; $g(x) = \dfrac{x - 1}{x}$

(d) $f(x) = 2x - 1$; $g(x) = \dfrac{1}{2}x - 1$

(e) $f(x) = |x|$; $g(x) = |x|$

25. The sum of all solutions of the equation $\frac{|2x-5|}{|x+2|} = 1$ is equal to:

(a) 3

(b) $\frac{-14}{3}$

(c) $\frac{28}{3}$

(d) 6

(e) 8

26. The domain D and the range R of the function $f(x) = \frac{\sqrt{4-9x^2}}{2}$ is given by:

(a) $D = \left[-\frac{2}{3}, \frac{2}{3}\right]$, $R = [0, \infty)$

(b) $D = \left[\frac{2}{3}, \infty\right)$, $R = [0, 1)$

(c) $D = \left(-\infty, -\frac{2}{3}\right]$, $R = [0, \infty)$

(d) $D = \left[-\frac{2}{3}, \frac{2}{3}\right]$, $R = [0, 1]$

(e) $D = \left[-\frac{2}{3}, \frac{2}{3}\right]$, $R = (-\infty, 0]$