

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

Prep-Year Math I  
SECOND EXAM  
Semester I, Term 061  
Tuesday, December 05, 2006  
Net Time Allowed: 75 minutes

*Sources of Problems*

**MASTER VERSION**

1. If  $M(h, 6)$  is the midpoint of the line segment from  $P(3, k)$  to  $Q(-5, 4)$ , then  $h + k =$

~~(a)~~ 7

See example 1 p.166

(b) -1

See Problems 19 to 24 p. 174-175

(c) 9

(d) 1

(e) 5

2. The center  $C(h, k)$  and the radius  $r$  of the circle

$$\frac{1}{2}x^2 + \frac{1}{2}y^2 - 3x + 2y - \frac{3}{2} = 0 \quad \text{are}$$

~~(a)~~  $C(3, -2), r = 4$

See example 7 p.173

(b)  $C(2, -3), r = 4$

See Problems 65 to 72 p.175

(c)  $C(3, -2), r = \sqrt{15}$

(d)  $C\left(\frac{3}{2}, -1\right), r = \frac{\sqrt{2}}{2}$

(e)  $C(3, -2), r = \sqrt{17}$

3. If  $x < 0$ , then the distance between the points  $P(2x, -7x)$  and  $Q(-2x, -4x)$  is equal to

~~(a)~~  $-5x$

(b)  $7x$

(c)  $-7x$

(d)  $5x$

(e)  $-3x$

See Problems 15 and 16 p. 174

4. If the graph of the function  $g(x)$  is obtained from the graph of  $f(x) = \sqrt{x}$  by means of a reflection across the  $x$ -axis, a horizontal shift 2 units left and a vertical shift 1 unit up then  $g(x) =$

~~(a)~~  $-\sqrt{x+2} + 1$

(b)  $\sqrt{x+2} - 1$

(c)  $-\sqrt{x-2} + 1$

(d)  $\sqrt{1-x} + 2$

(e)  $-\sqrt{x+2} - 2$

See examples 4 and 5 p. 233-234

See problems 57 to 60 p. 239

5. Identify the set of ordered pairs  $(x, y)$  or the relation which defines  $y$  as a function of  $x$

~~(a)~~  $5y + x = 2y + \sqrt{x^2 - 5}$

See example 3 p.181

(b)  $\left\{ \left( \frac{1}{2}, 0 \right), (2, -1), (3, 3), \left( \frac{1}{2}, \frac{1}{4} \right) \right\}$

See problems 11 to 26 p.191

(c)  $(x - 1)^2 + (y - 2)^2 = 25$

(d)  $|y| = x + 5$

(e)  $y^2 = x^2$

6. A ball is thrown vertically upward. If the height  $h$  in feet of the ball is given by the equation  $h(t) = -16t^2 + 80t + 100$  where time  $t$  is in seconds, then the maximum height that the ball attains is

~~(a)~~ 200 feet

See example 7 p.221

(b) 150 feet

See problems 69 and 70 p. 225

(c) 300 feet

(d) 100 feet

(e) 250 feet

7. The equation of the line that passes through the point  $(3, 5)$  and perpendicular to the line  $2x + 5y - 4 = 0$  is

~~(a)~~  $5x - 2y - 5 = 0$

See problems 73 to 76 p. 211

(b)  $5x + 2y - 25 = 0$

(c)  $5x - 2y + 15 = 0$

(d)  $2x - 5y + 19 = 0$

(e)  $5x - 2y - 30 = 0$

8. The  $x$ -intercept of the line passing through the points  $(5, -6)$  and  $(2, -8)$  is

~~(a)~~  $(14, 0)$

See Problems 35 to 38 p. 208  
and 45 to 48 p. 208

(b)  $(18, 0)$

(c)  $(10, 0)$

(d)  $\left(-\frac{28}{3}, 0\right)$

(e)  $\left(\frac{2}{3}, 0\right)$

9. If the lines  $kx + 4y = 24$  and  $y = -\frac{3}{k+1}x + \frac{15}{4}$  are parallel, then the set of values of  $k$  consists of

~~(a)~~ one positive and one negative integers

(b) two positive integers

(c) two negative integers

(d) one positive integer only

(e) one negative integer only

*This is an application of the concept that two lines are parallel if they have the same slope.*

10. The graph of the equation

$$y^3 = -x^3y^2 + \frac{x}{|x|}$$

is symmetric with respect to

~~(a)~~ the origin only

(b) the  $x$ -axis only

(c) the  $y$ -axis only

(d) the  $x$ -axis and the origin

(e) the  $y$ -axis and the origin

*See example 1 p. 229*

*and example 2 p. 230*

*See problems 13 to 30 p. 238*

11. Which one of the following numbers is in the range of the quadratic function  $f(x) = -2x^2 + x - \frac{3}{8}$ ?

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

See example 3 p. 217

(b) 2

see problems 33 and 34 p. 223

(c)  $-\frac{1}{8}$

(d) 0

(e)  $-\frac{1}{16}$

12. If  $[y]$  denotes the greatest integer less than or equal to  $y$ , then the domain  $D$  and the range  $R$  of the function  $f(x) = |[x]| + 1$  are given by

(a)  $D = (-\infty, \infty)$ ,  $R =$  all natural numbers

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

see the definition of the  
greatest integer function  
p. 186

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

(d)  $D = R = (-\infty, \infty)$

See problems 43 and 44 p. 191

(e)  $D = (-\infty, \infty)$ ,  $R =$  all nonnegative integers

13. The domain, in interval notation, of the function  $f(x) = \sqrt{2 - x - x^2}$  is

~~(a)~~  $[-2, 1]$

See example 4 p. 182

(b)  $(-\infty, -2] \cup [1, \infty)$

See problems 27 & 38 p. 191

(c)  $(-\infty, -1] \cup [2, \infty)$

(d)  $(-\infty, 1]$

(e)  $[-2, \infty)$

14. The function  $f(x) = \begin{cases} -2x + 1 & \text{if } x < -2 \\ -x^2 & \text{if } -2 \leq x \leq 2 \\ -4 & \text{if } x > 2 \end{cases}$   
is **increasing** on the interval [Hint: sketch]

~~(a)~~  $[-2, 0]$

See example 5 p. 183

(b)  $(-\infty, -2] \cup [2, \infty)$

See problems 39 & 42 p. 191

(c)  $[-2, \infty)$

(d)  $(-\infty, -2]$

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



15. Let  $f$  be a function such that  $f(-1) = 3$  and  $f(2) = -4$ . The coordinates of two points on the graph of  $y = 3f(-x) - 2$  are

~~(a)~~  $(1, 7), (-2, -14)$

See Problems 61 and 62 p. 239

(b)  $(1, 1), (-2, -14)$

(c)  $(1, 7), (2, 2)$

(d)  $(-1, 1), (2, 6)$

(e)  $(1, 7), (2, 4)$