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

(b) -1

(c) 9

(d) 1

(e) 5

See example 1 p. 166

See Problems 19 to 24 p. 174-175

2. The center $C(h,k)$ and the radius r of the circle $\frac{1}{2}x^2+\frac{1}{2}y^2-3x+2y-\frac{3}{2}=0$ are

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

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

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

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

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

See example 7 p. 173

See Problems 65 to 72 p. 175

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

(a) $-5x$

See Problems 15 and 16 p. 174

(b) $7x$

(c) $-7x$

(d) $5x$

(e) $-3x$

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 $g(x) =$

See examples 4 and 5 p. 233-234

See problems 57 & 60 p. 239

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

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

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

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

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

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

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

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

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

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

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

See example 3 p.181
See problems 11 to 26 p.191

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

(b) 150 feet

(c) 300 feet

(d) 100 feet

(e) 250 feet

See example 7 p.221
See Problems 69 and 70 p.225

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

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

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

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

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

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

See problems 73 & 76 p. 211

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

(a) $(14, 0)$

(b) $(18, 0)$

(c) $(10, 0)$

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

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

See problems 35 & 38 p. 208
and 45 & 48 p. 208

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

See example 1 p. 229 and example 2 p. 230

See problems 13 & 30 p. 238

(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

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

See example 3 P. 217
See problems 33 and 34 P. 223

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

(b) 2

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

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

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

See the definition of the greatest integer function P. 186
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) $[-2, 1]$

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

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

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

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

See example 4 p. 182

See problems 27 & 38 p. 191

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) $[-2, 0]$

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

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

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

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

See example 5 p. 183

See problems 39 & 42 p. 191

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