Math120 College Algebra - Spring 2008 - DLA - PreTest 3

Name SOLUTIONS !

Each of the 19 questions is worth 5 points plus 1 points for each of 5 homework problems for a total of 100

Find the distance between the pair of points.

1) (2, -7) (4, 5)

$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$= \sqrt{(4-2)^2 + (5-(-7))^2}$$

$$= \sqrt{2^2 + 12^2}$$

$$= \sqrt{4+144}$$

$$= \sqrt{148} = \sqrt{4}\sqrt{37}$$

$$\boxed{d = 2\sqrt{37}}$$

Decide whether or not the points are the vertices of a right triangle.

2) (3, -6), (12, -6), (12, -2)

A B C

$$d(A,B) = \sqrt{(12-3)^2 + (-6-(-6))^2} = 9$$

$$d(B,C) = \sqrt{(12-12)^2 + (-2-(-6))^2} = 4$$

$$d(C,A) = \sqrt{(12-3)^2 + (-2-(-6))^2} = \sqrt{81+16} = \sqrt{97}$$

$$9^2 + 4^2 \stackrel{?}{=} (\sqrt{97})^2$$

$$97 \stackrel{?}{=} 97$$

YES

Graph the ellipse.

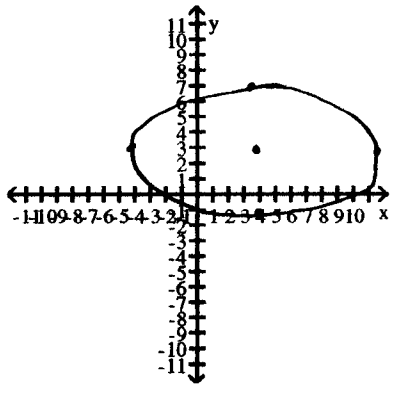
3) $\frac{(x-4)^2}{64} + \frac{(y-3)^2}{16} = 1$

$$\frac{(x-4)^2}{8^2} + \frac{(y-3)^2}{4^2} = 1$$

CENTER IS (4, 3)

MAJOR AXIS IS $2a = 16$

MINOR AXIS IS $2b = 8$



x	y
12	3
-4	3
4	7
4	-1

Find the center, foci, and asymptotes of the hyperbola.

4) $\frac{y^2}{225} - \frac{x^2}{400} = 1$

$\frac{y^2}{15^2} - \frac{x^2}{20^2} = 1$ $\quad a = 15$ $\quad b = 20$ $\quad c = \sqrt{a^2 + b^2}$

$c = \sqrt{15^2 + 20^2} = \sqrt{625} = 25$

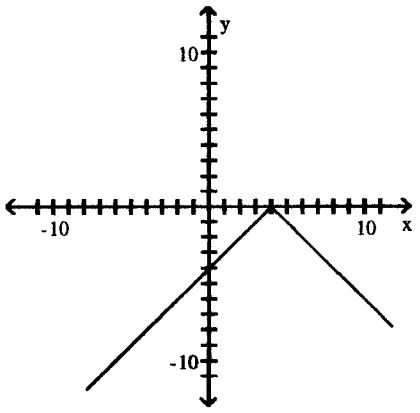
CENTER = $(0,0)$

FOCI = $(0, \pm c) = (0, \pm 25)$

ASYMPTOTES: $y = \pm \frac{15}{20} x$ $\quad y = \pm \frac{3}{4} x$

Determine the intervals over which the function is decreasing, increasing, and constant.

5)



INCREASING $(-\infty, 4]$

DECREASING $[4, \infty)$

Solve the problem.

6) Find f(3) when $f(x) = x^2 - 5x - 3$

$f(3) = (3)^2 - 5(3) - 3$

$= 9 - 15 - 3$

$f(3) = -9$

Find the slope of the line satisfying the given conditions.

7) (1, -5) and (-8, -2)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 - (-5)}{-8 - 1} = \frac{3}{-9} = -\frac{1}{3}$

Solve the problem. Round your answer, as needed.

8) A deep sea diving bell is being lowered at a constant rate. After 12 minutes, the bell is at a depth of 600 ft. After 35 minutes the bell is at a depth of 1600 ft. What is the average rate of lowering per minute?

$\text{SLOPE} = \frac{\Delta FT}{\Delta MIN}$ $\quad \frac{1600-600}{35-12} = \frac{1000}{23} = 43.47826$

$\sim 43.5 \text{ ft/min}$

Write the equation of the line.

9) $m = \frac{7}{8}$ (0, 3) is on the line.

SLOPE $= \frac{7}{8}$ $\quad$ Y-INTERCEPT $= (0,3)$

$y = \frac{7}{8}x + 3$ SLOPE-INT. FORM

OR

$8y = 7x + 24$

$-7x + 8y = 24$ STD. FORM

10) Through (7, 9),
perpendicular to $-6x + 7y = 21$

$7y = 6x + 21$

$y = \frac{6}{7}x + 3$

$\perp$ SLOPE TO THIS LINE IS $-\frac{7}{6}$

$m = \frac{y - y_1}{x - x_1}$

$-\frac{7}{6} = \frac{y-9}{x-7}$

$y - 9 = -\frac{7}{6}(x-7)$

$y - 9 = -\frac{7}{6}x + \frac{49}{6}$

$y = -\frac{7}{6}x + \frac{49}{6} + 9$

$y = -\frac{7}{6}x + \frac{49}{6} + \frac{54}{6}$

$y = -\frac{7}{6}x + \frac{103}{6}$

Solve.

11) A company can make 9 bridge bulkheads for $93,700, while 14 bridge bulkheads cost $96,850. Let y be the cost to produce x bridge bulkheads.

$$m = \frac{96,850 - 93,700}{14 - 9} = \frac{3150}{5} = 630 \left[\$/\text{BULKHEAD}\right]$$

$$630 = \frac{y - 93,700}{x - 9} \qquad y - 93700 = 630(x - 9)$$

$$y = 630x - 5670 + 93700$$

$$\boxed{y = 630x + 88,030}$$

Find the requested value.

12)

$$f(-8) \text{ for } f(x) = \begin{cases} 3x + 1, & \text{if } x < 8 \\ 8x, & \text{if } 8 \le x \le 12 \\ 8 - 7x, & \text{if } x > 12 \end{cases}$$

$x = -8$ FALLS IN THE 1ST SEGMENT SO

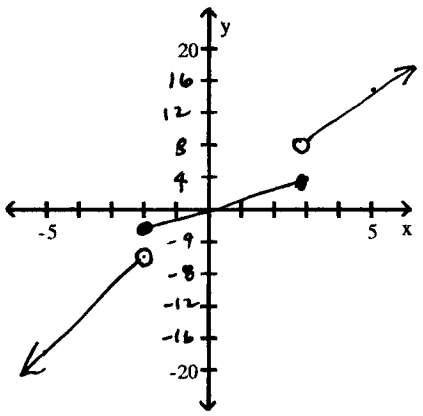
$$f(-8) = 3(-8) + 1$$
$$= -24 + 1$$

$$\boxed{f(-8) = -23}$$

Graph the function.

13)

$$f(x) = \begin{cases} 4x + 2 & \text{if } x < -2 \\ x & \text{if } -2 \le x \le 3 \\ 3x - 1 & \text{if } x > 3 \end{cases}$$



SEGMENT 1

x	y
-5	-18
-2	-6

2

x	y
-2	-2
3	3

3

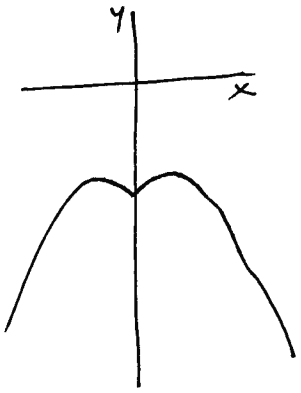
x	y
3	8
5	14

Determine whether the function is symmetric with respect to the y-axis, symmetric with respect to the x-axis, symmetric with respect to the origin, or none of these.

14) $f(x) = -0.20x^2 + |x| - 9$

x	y
-6	-10.2
-5	-9
-4	-8.2
-3	-7.8
-2	-7.8
-1	-8.2
0	-9

x	y
1	-8.2
2	-7.8
3	-7.8
4	-8.2
5	-9
6	-10.2



SYM. WRT Y-AXIS ONLY

ALGEBRAIC SOL:

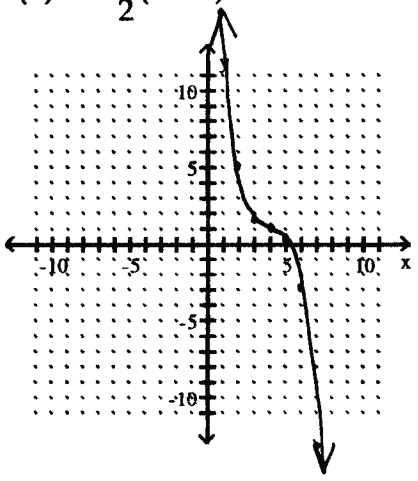
$f(-x) = -0.2(-x)^2 + |-x| - 9$

$= -0.2x^2 + |x| - 9$

SAME EQ. AS ORIG. EQ. SO SYM. WRT Y-AXIS

Graph the function.

15) $f(x) = -\frac{1}{2}(x-4)^3 + 1$



x	y
0	33
1	14.5
2	5
3	1.5
4	1
5	.5
6	-3
7	-12.5
8	-31

Find the equation of the axis of symmetry of the parabola.

16) $f(x) = (x+3)^2 + 7$

$f(x) = a(x-h)^2 + k$

$a = 1$

$h = -3$

$k = 7$

AXIS IS AT $x = h$

$x = -3$

Perform the requested operation or operations.

17) $f(x) = 5x - 5$, $g(x) = 3x - 8$

Find $(f - g)(x)$.

$$(f-g)(x) = f(x) - g(x)$$

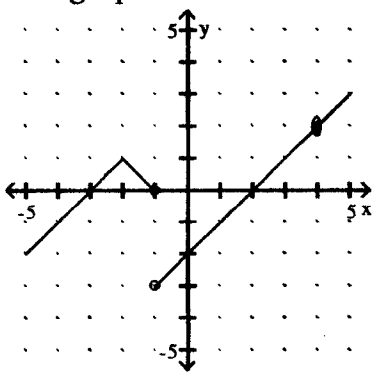
$$= (5x-5) - (3x-8)$$

$$= 5x - 5 - 3x + 8$$

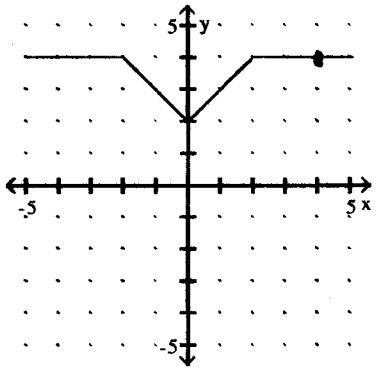
$$\boxed{(f-g)(x) = 2x+3}$$

Find the requested value.

18) The graphs of functions f and g are shown. Use these graphs to find $f(4) + g(4)$.



$y = f(x)$



$y = g(x)$

$f(4) = 2$

$g(4) = 4$

$f(4) + g(4) = 2 + 4$

$\boxed{f(4) + g(4) = 6}$

If f is one-to-one, find an equation for its inverse.

19) $f(x) = -7x + 1$

IF $y = -7x + 1$, ITS INVERSE IS $x = -7y + 1$

$$-7y = x - 1$$

$$y = -\frac{1}{7}x + \frac{1}{7}$$

$$\boxed{f^{-1}(x) = -\frac{1}{7}x + \frac{1}{7}}$$