QUIZ #1 @ 90 points

Write neatly. Show all work. **Write all responses on separate paper. Clearly label the exercises.**

1. Let $(8,-4)$ and $(-6,1)$ be two points in the plane. Find the following:

a) The distance between the two points.

b) The coordinates of the midpoint of the segment with endpoints the two given points.

c) An equation of the line passing through the two points.

d) The slope of a line that is perpendicular to the line passing through the two points.

2. Show that $2x^2+2y^2-6x+10y-1=0$ has a circle as its graph. Find the center and radius.

3. $f(x)=2x+5$. Do the following:

a) Find $f(-1)$ and $f(a+h)$.

b) Graph the equation showing the x- and y-intercepts.

c) Find the domain and range of the function.

d) What is the slope?

e) Is the function increasing or decreasing?

4. Average annual tuition and fees for in-state students at public 4-year colleges are shown in the table for selected years. Answer the following:

a) What are the variables in the problem? Which variable is independent, which one is dependent?

b) Find a linear equation that models the cost in terms of the number of years since 1996 using two of the given points (for example, the first and last).

c) Use your equation to predict the cost of tuition and fees at public 4-year colleges in 2008.

year	cost (in dollars)
1996	3151
1998	3486
2000	3774
2006	5836

(c) Domain: $\boxed{x \in \mathbb{R}}$
Range: $\boxed{y \in \mathbb{R}}$

(d) $f(x) = 2x+5$ is the slope-intercept form, so $\boxed{m = 2}$

(e) $\boxed{\text{increasing}}$ $(m > 0)$

(4)

(a) time = the independent variable
cost = the dependent variable

(b) let t = the number of years after 1996
C = the cost of tuition and fees

We'll use 1996 and 2006

1996: $t = 0$, $C = 3151$ $(0, 3151)$
2006: $t = 10$, $C = 5836$ $(10, 5836)$

so $m = \dfrac{\Delta C}{\Delta t}$

$m = \dfrac{5836 - 3151}{10 - 0}$

$m = 268.50$ \$/year

we use $(0, 3151)$ and $m = 268.50$

$C = mt + b$ $(y = mx + b)$

$\boxed{C = 268.50t + 3151}$

(c) 2008: $t = 12$

$C = 268.50(12) + 3151$

$\boxed{C = 6373 \text{ \$}}$

The cost of tuition and fees in 2008.

Math 130

$\boxed{\text{Quiz \#1}}$

① (8, −4) and (−6, 1)

(a) $d^2 = (\Delta x)^2 + (\Delta y)^2$

$d^2 = (8-(-6))^2 + (1-(-4))^2$

$d^2 = 14^2 + 5^2$

$d^2 = 221$

$\boxed{d = \sqrt{221}}$

(b) Let $M(x_M, y_M)$ = the midpoint

$x_M = \frac{8+(-6)}{2} = 1$

$y_M = \frac{-4+1}{2} = \frac{-3}{2}$

so $\boxed{M(1, -\frac{3}{2})}$

(c) $m = \frac{\Delta y}{\Delta x}$

$m = \frac{1-(-4)}{-6-8} = \frac{5}{-14}$

we'll use $(8,-4)$ and $m = \frac{-5}{14}$

$y - y_1 = m(x - x_1)$

$y-(-4) = \frac{-5}{14}(x-8)$

$\boxed{y + 4 = \frac{-5}{14}(x-8)}$

(d) if $m = -\frac{5}{14}$

then $\boxed{m_{\perp} = \frac{14}{5}}$

(2) $2x^2 + 2y^2 - 6x + 10y - 1 = 0$

$2x^2 + 2y^2 - 6x + 10y = 1 \quad / \div 2$

$x^2 + y^2 - 3x + 5y = \frac{1}{2}$

$x^2 - 3x + y^2 + 5y = \frac{1}{2}$

$\left(\frac{1}{2}\,\text{coef.}\,x\right)^2 = \left(\frac{1}{2}(-3)\right)^2 = \frac{9}{4}$

$\left(\frac{1}{2}\,\text{coef.}\,y\right)^2 = \left(\frac{1}{2}\cdot 5\right)^2 = \frac{25}{4}$

$x^2 - 3x + \frac{9}{4} + y^2 + 5y + \frac{25}{4} = \frac{1}{2} + \frac{9}{4} + \frac{25}{4}$

$\left(x - \frac{3}{2}\right)^2 + \left(y + \frac{5}{2}\right)^2 = \frac{2+34}{4}$

$\left(x - \frac{3}{2}\right)^2 + \left(y + \frac{5}{2}\right)^2 = 9$

Therefore, the equation represents a circle with

$\boxed{\begin{array}{l}\text{center } \left(\frac{3}{2}, \frac{-5}{2}\right) \\ \text{radius } \sqrt{9} = 3\end{array}}$

(3) $f(x) = 2x + 5$

(a) $f(-1) = 2(-1) + 5$ $\quad \boxed{f(-1) = 3}$

$f(a+h) = 2(a+h) + 5$ $\quad \boxed{f(a+h) = 2a + 2h + 5}$

(b)

x	y	
0	5	(0,5)
$-\frac{5}{2}$	0	$(-\frac{5}{2}, 0)$

$y = 0,\ 2x + 5 = 0$

$2x = -5$

$x = \frac{-5}{2}$