Serial #: _____ ID _____ NAME _____

Show all necessary steps for full marks.

Question 1: (5 points): If $M\left(5,\frac{3}{2}\right)$ is the midpoint of the line segment joining the points $P_1(x,8)$ and $P_2(3,y)$, then find the distance between P_1 and P_2. **(Show all necessary steps)**

Solution:

$$\left(\frac{3+x}{2},\frac{y+8}{2}\right)=\left(5,\frac{3}{2}\right) \Rightarrow \frac{3+x}{2}=5 \text{ and } \frac{y+8}{2}=\frac{3}{2}$$

$$\Rightarrow 3+x=10 \text{ and } 2y+16=6$$

$$\Rightarrow x=7 \text{ and } y=-5$$

$$P_1(x,8)=(7,8),\ P_2(3,y)=(3,-5)$$

$$d(P_1,P_2)=\sqrt{(7-3)^2+(8+5)^2}=\sqrt{16+169}=\sqrt{185}$$

Question 2: (5 points): Let **M** be the midpoint of the line whose endpoints are $(1,-2)$ and $(-3,6)$, and let **C** be the center of the circle $x^2+4x+y^2-8y+2=0$. Find the distance between **M** and **C**.

(Show all necessary steps)

Solution: $\mathbf{M}=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{1+(-3)}{2},\frac{-2+6}{2}\right)=(-1,2)$

$$x^2+4x+y^2-8y=-2$$

$$x^2+4x+2^2+y^2-8y+4^2=-2+4+16$$

$$(x+2)^2+(y-4)^2=18 \Rightarrow \mathbf{C}=(-2,4)$$

$$d(\mathbf{M},\mathbf{C})=\sqrt{(-2+1)^2+(4-2)^2}=\sqrt{1+4}=\sqrt{5}$$

Answer: (c) $\sqrt{5}$

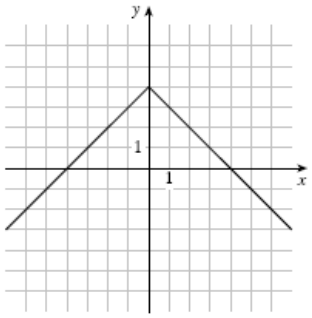
Question 3: (4 points): (Exercises 35-36): Sketch the graph of the following equations:

Solution:

(a): $y = 4 - |x|$

35. $y = 4 - |x|$.

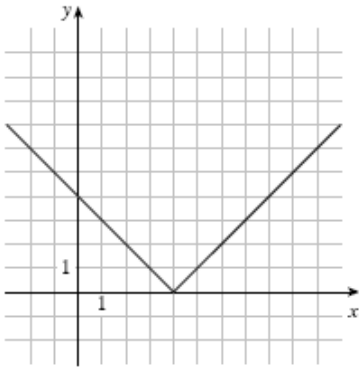
x	y
−6	−2
−4	0
−2	2
0	4
2	2
4	0
6	−2



(b): $y = |4 - x|$

36. $y = |4 - x|$.

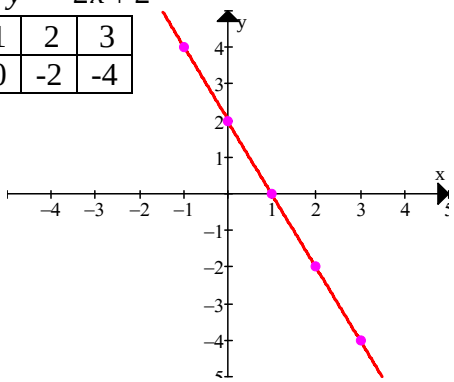
x	y
−6	10
−4	8
−2	6
0	4
2	2
4	0
6	2
8	4
10	6



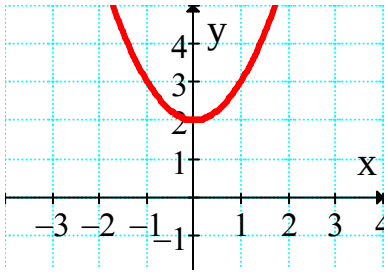
(c): $4x + 2y - 4 = 0$

$2y = -4x + 4 \Rightarrow y = -2x + 2$

x	-2	-1	0	1	2	3
y	6	4	2	0	-2	-4



(d): $y - x^2 = 2$



Question 4: (6 points): Find the center and radius of the circle $x^2 + y^2 + 6x - 8y - 11 = 0$ and sketch the graph of the circle.

Solution: $x^2 + 6x + y^2 - 8y = 11$

$x^2 + 6x + 3^2 + y^2 - 8y + 4^2 = 11 + 3^2 + 4^2$

$(x + 3)^2 + (y - 4)^2 = 6^2$

The center is $(-3, 4)$ and the radius is 6.