Math 2433-001   Quiz 2   Name: <ins>Solutions</ins>

Q1].. The equation
$$x^2 + 4y^2 - 4x + 8y = 1$$
represents an ellipse in the plane.

Draw this ellipse, indicating its center, foci and points of intersection of the ellipse with horizontal and vertical lines through its center.

$$x^2 - 4x \qquad + 4(y^2 + 2y) = 1$$

$$x^2 - 4x + 4 + 4(y^2 + 2y + 1) = 1 + 4 + 4(1)$$

$$(x-2)^2 + 4(y+1)^2 = 9$$

$$\left(\frac{x-2}{3}\right)^2 + \left(\frac{y+1}{3/2}\right)^2 = 1 \qquad \text{Ellipse}$$

$$\text{Center} = (2, -1) \qquad c = \sqrt{a^2 - b^2} = \sqrt{3^2 - \left(\tfrac{3}{2}\right)^2}$$

$$= \sqrt{\tfrac{27}{4}} = \frac{3\sqrt{3}}{2}$$

$$\text{Vertices} = \left(2 + \tfrac{3\sqrt{3}}{2}, -1\right) \qquad \left(2 - \tfrac{3\sqrt{3}}{2}, -1\right)$$

Horiz Line intersections! $(2, -1) \pm (3, 0) = (-1, -1)$ and $(5, -1)$

Vertical Line intersections!
$(2, -1) \pm (0, 3/2) = (2, \tfrac{1}{2})$ and $(2, -\tfrac{5}{2})$

1