Question 1 (2 points) Find the equation of the circle with center \((-2, 1)\) which passes through the origin.

Since the center is \((-2, 1)\) and \((0,0)\) is on the circle, the circle's radius \(r\) is
\[r = d((-2, 1), (0,0)) = \sqrt{(-2-0)^2 + (1-0)^2} = \sqrt{4+1} = \sqrt{5}\]

So, the equation is \((x+2)^2 + (y-1)^2 = 5\).

Question 2 (2 points) Find all \(x\)-intercepts and \(y\)-intercepts of the graph from Question 1.

\(x\)-intercept: Set \(y = 0\) in above to get that
\[(x+2)^2 + (0-1)^2 = 5 \implies (x+2)^2 = 4 \implies |x+2| = 2\]
\[\implies x = -4 \text{ or } x = -4\]

So, the \(x\)-intercepts are \((0,0)\) and \((-4, 0)\).

\(y\)-intercept: Set \(x = 0\) in above to get that
\[(0+2)^2 + (y-1)^2 = 5 \implies (y-1)^2 = 1 \implies |y-1| = 1 \implies y = 2 \text{ or } y = 0\]

So, the \(y\)-intercepts are \((0,2)\) and \((0,0)\).
Question 3 (3 points) Suppose the points (2, 1) and (3, 5) are on the opposite side of the diameter of a circle. Find:

(a): The center of this circle
(b): The radius of this circle

a) The center is the midpoint between the pts (2, 1) and (3, 5), so the center is

\[ C = \left( \frac{2+3}{2}, \frac{1+5}{2} \right) = \left( \frac{5}{2}, 3 \right) \]

b) The radius is half the distance between the pts (2, 1) and (3, 5), so the radius is

\[ \frac{1}{2} \cdot d((2, 1), (3, 5)) = \frac{1}{2} \cdot \sqrt{(2-3)^2 + (1-5)^2} \]

\[ = \frac{1}{2} \cdot \sqrt{1 + 16} \]

\[ = \frac{\sqrt{17}}{2} \]