1. Find the distance between the points \((-1, 2)\) and \((-\frac{5}{2}, -4\)). Provide the exact answer in a simplified form.

\[ d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2} \]
\[ d = \sqrt{(-5+1)^2 + (-4-2)^2} \]
\[ d = \sqrt{5^2} \]
\[ d = \sqrt{25} \]
\[ d = 5 \]

\[ d = \sqrt{16+36} \]
\[ d = \sqrt{52} \]
\[ d = 2\sqrt{13} \]

2. Find the midpoint of the line segment joining the points \((x_1, y_1)\) and \((x_2, y_2)\). Provide the exact answer.

\[ M = \left( \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right) \]
\[ M = \left( \frac{1+\sqrt{3}}{2}, \frac{-2+6}{2} \right) = \left( \frac{2+\sqrt{3}}{2}, \frac{4}{2} \right) = \left( \sqrt{3}, 2 \right) \]

3. Find the exact x and y-intercepts of the straight line \(\frac{2}{3}x - \frac{1}{2}y = 6\). Use the intercepts to graph the line.

\[ \text{X-int: } \text{Set } y = 0 \]
\[ \frac{2}{3}x - \frac{1}{2}(0) = 6 \]
\[ \frac{2}{3}x = 6 \]
\[ x = \frac{3}{2} \cdot 6 = 9 \]

\[ \text{Y-int: } \text{Set } x = 0 \]
\[ \frac{2}{3}(0) - \frac{1}{2}y = 6 \]
\[ -\frac{1}{2}y = 6 \]
\[ y = 6(-2) = -12 \]

4. Find the center and radius of the circle \((x+3)^2 + (y-1)^2 = 16\), and graph it.

\[ \text{Center: } (h, k) = (-3, 1) \]
\[ \text{Rad: } \sqrt{16} = 4 \]

5. Find the center and radius of the circle \(x^2 + y^2 - 2x + 3y - 1 = 0\). Provide the exact answers.

\[ (x^2 - 2x) + (y^2 + 3y) = 1 \]
\[ (x-1)^2 + (y+\frac{3}{2})^2 = 1 + \left( \frac{3}{2} \right)^2 \]
\[ (x-1)^2 + \left( y + \frac{3}{2} \right)^2 = 1 + \frac{9}{4} \]
\[ \therefore \text{Center: } \left( \frac{1}{2}, -\frac{3}{2} \right) \text{ rad: } \sqrt{\frac{17}{4}} = \frac{\sqrt{17}}{2} \]
6. Find the equation of the line passing through the points \((2, -3)\) and \((-5, -7)\). Provide the exact answer in the slope-intercept form.

\[
\text{slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - (-3)}{-5 - 2} = \frac{4}{-7} = -\frac{4}{7}
\]

\[
\text{eqn: } y - y_1 = m(x - x_1)
\]

\[
y + 3 = \frac{4}{7} (x - 2)
\]

\[
y = \frac{4}{7} x - \frac{8}{7}
\]

\[
y = \frac{4}{7} x - \frac{8}{7} - 3
\]

7. Find the equation of the line perpendicular to the line \(4x + 3y - 2 = 0\), and which passes through the point \((-2, -5)\). Leave your answer in the standard form with integral coefficients.

\[
4x + 3y = 2
\]

\[
3y = -4x + 2
\]

\[
y = -\frac{4}{3}x + \frac{2}{3}
\]

\[
\text{slope of given line } = -\frac{4}{3}
\]

\[
\text{slope of } \perp \text{ line } = \frac{3}{4} = m
\]

\[
\text{eqn of } \perp \text{ line: } y - y_1 = m(x - x_1)
\]

\[
y + 5 = \frac{3}{4} (x + 2)
\]

\[
4(y + 5) = 3(x + 2)
\]

\[
y + 20 = 3x + 6
\]

\[
-3x + 4y = -14
\]

8. Find the slope and the \(x\)-intercept of the line \(\frac{2}{3}x - \frac{1}{2}y = 1\). Provide the exact answers.

\[
\text{slope: solve for } y
\]

\[
\frac{1}{2} y = \frac{2}{3}x - 1
\]

\[
y = \frac{4}{3}x - 2
\]

\[
\text{slope } = m = \frac{4}{3}
\]

\[
\text{x-inter: Set } y = 0
\]

\[
\frac{2}{3}x - \frac{1}{2}(0) = 1
\]

\[
\frac{2}{3}x = 1
\]

\[
x = \frac{3}{2}
\]

9. Find the equation of the circle having \((-2, 8)\) and \((-4, 2)\) as the ends points of a diameter.

\[
\text{center: } C = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-2 - 4}{2}, \frac{8 + 2}{2}\right) = (-3, 5) = (h, k)
\]

\[
diameter = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(-4 + 2)^2 + (2 - 8)^2} = \sqrt{4 + 36} = \sqrt{40} = 2\sqrt{10}
\]

\[
eqn: (x - h)^2 + (y - k)^2 = r^2
\]

\[
(x + 3)^2 + (y - 5)^2 = (\sqrt{10})^2
\]

\[
\therefore (x + 3)^2 + (y - 5)^2 = 10
\]

10. Find the slope of the line passing through the points \(\left(\frac{\pi}{2}, 2\right)\) and \(\left(\frac{3\pi}{2}, 1\right)\). Provide the exact answer.

\[
\text{slope } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{3 + 2}{\frac{\pi}{2} - \frac{\pi}{2}} = \frac{5}{0} = \frac{5 \cdot (-6)}{\pi} = -\frac{30}{\pi}
\]