Quiz 1
Friday, January 29, 2010

NO CALCULATORS. Show your reasoning. Use standard notation correctly.

1. (8 points) Find the midpoint of the segment having endpoints \( \left( \frac{1}{3}, -\frac{2}{5} \right) \) and \( \left( \frac{3}{2}, \frac{1}{7} \right) \). Simplify your answer.

\[
\begin{align*}
\text{x-coordinate:} & \quad \frac{1}{3} + \frac{2}{2} = \frac{6}{2} \left( \frac{1}{3} + \frac{3}{2} \right) \\
& \quad = \frac{\frac{6}{3} + \frac{6}{2}}{12} \\
& \quad = \frac{2 + 9}{12} \\
& \quad = \frac{11}{12} \\
\text{y-coordinate:} & \quad -\frac{2}{5} + \frac{1}{7} = \frac{35}{2} \left( -\frac{2}{5} + \frac{1}{7} \right) \\
& \quad = \frac{-\frac{35}{5} + \frac{35}{7}}{70} \\
& \quad = \frac{-14 + 5}{70} \\
& \quad = \frac{-9}{70} \\
\text{midpoint:} & \quad \left( \frac{11}{12}, \frac{-9}{70} \right) \text{ (parentheses needed for ordered pair notation.)}
\end{align*}
\]

2. (9 points) Find the center and radius of the circle. HINT: Complete the squares. Simplify your answers.

\[x^2 + 6x + y^2 - 8y = 3\]

\[
\begin{align*}
(x + 3)^2 + (y - 4)^2 & = 3 + 9 + 16 \\
& = 28 \\
& \Rightarrow r = \sqrt{28} = \sqrt{4 \cdot 7} = 2\sqrt{7}
\end{align*}
\]

center: \((-3, 4)\) \quad radius: \(2\sqrt{7}\)
3. (8 points) Given that \( f(x) = \frac{x}{4-x} \), find and simplify each of the following (or state “undefined” or “not a real number”).

(a) \( f(4) \) is undefined since \( \text{denom} = 4-4 = 0 \).

(b) \( f \left( \frac{5}{6} \right) = \frac{\frac{5}{6}}{4-\frac{5}{6}} = \frac{6\left(\frac{5}{6}\right)}{6\left(4-\frac{5}{6}\right)} = \frac{5}{24-5} = \frac{5}{19} \).

(c) \( f(-x) = \frac{-x}{4-(-x)} = \frac{-x}{4+x} \).

(d) \( f(x+h) = \frac{(x+h)}{4-(x+h)} = \frac{x+h}{4-x-h} \).