

Quiz 9 — 11/09/17

Name: _____ Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (2 points) Find the moments and center of mass of the system of objects that have masses 3, 4, and 8 at the points $(-1, 1)$, $(2, -1)$, and $(3, 2)$, respectively.

Solution:

$$\begin{aligned}\text{mass } m &= 3 + 4 + 8 = 15 \\ M_y &= 3(-1) + 4(2) + 8(3) = 29 \\ M_x &= 3(1) + 4(-1) + 8(2) = 15 \\ \bar{x} &= \frac{M_y}{m} = \frac{29}{15} \\ \bar{y} &= \frac{M_x}{m} = \frac{15}{15} = 1 \\ \text{center of mass} &= \left(\frac{29}{15}, 1 \right)\end{aligned}$$

2. (3 points)) For the following parametric curve, find an equation for the tangent to the curve at the specified value of the parameter.

$$x(t) = e^t + 2t; \quad y(t) = 4e^{0.5t}; \quad t = 0$$

Solution: The tangent line is at the point $(1, 4)$.

$$x'(t) = e^t + 2 \qquad x'(0) = 3 \quad (1 \text{ point})$$

$$y'(t) = 2e^{0.5t} \qquad y'(0) = 2 \quad (1 \text{ point})$$

Putting this together we get the equation (1 point)

$$y - 4 = \frac{2}{3}(x - 1)$$