Name: _____ Section: _____

Answer all questions and show your work. Unsupported answers may receive *no credit*. You may not use a calculator on this quiz. Allow 15 minutes for the quiz.

1. (5 points) Consider a lamina which is the quarter circle, $Q = \{(x, y) : x^2 + y^2 \leq 4,\ x \geq 0,\ y \geq 0\}$ with density 3 units of mass per unit of area.

   Write integrals which give the moments M_x, M_y and the total mass M of the lamina. Do not evaluate the integrals.

   Solution: The total mass is $M = 3\int_0^2 \sqrt{4-x^2}\,dx$ (1 point). The moment M_x is $M_x = \frac{3}{2}\int_0^2 (4-x^2)\,dx$ (2 points) and the moment M_y is given by $M_y = 3\int_0^2 x\sqrt{4-x^2}\,dx$ (2 points).

   –Give 2 of 4 points for moments if M_x and M_y are switched.

2. (2 points) Does the curve with parametric equations $x = t+1$ and $y = t^3 - t - 2$ contain the point $(3, 4)$? If the answer is no, explain why. If the answer is yes, find t.

   Solution: We want to find t with $(t+1, t^3 - t - 2) = (3, 4)$. The equation $t + 1 = 3$ is easy to solve and gives $t = 2$. Substituting $t = 2$ in the equation for y gives $y = 2^3 - 2 - 2 = 4$. Thus the curve contains (3.4). (1 point for answer, 1 point for finding t)

3. (3 points) Consider the curve given by the parametric equations $x = 2t - 4$ and $y = t^2$. Find a cartesian equation for the curve and put the equation in the form $y = ax^2 + bx + c$.

   Solution: We solve to express t in terms of x to obtain $t = \frac{1}{2}x + 2$. Substituting for t in the equation for y gives $y = \left(\frac{1}{2}x + 2\right)^2 = \frac{1}{4}x^2 + 2x + 4$.

   (1 point, solve for t, 1 point substitute for t in equation for y, 1 point for simplifying)