Math 182 — Midterm 3 practice exam Print Name: ______________________

1. Find the exact length of the curve.
$$y = \ln(\sec(x)), \quad 0 \le x \le \pi/4.$$
2. Find the centroid of the region in the first quadrant bounded by the given curves.
$$y = x^3, \quad x = y^3$$
3. A function $y(t)$ satisfies the differential equation
$$\frac{dy}{dt} = y^4 - 13y^3 + 42y^2.$$
   (a) What are the constant (equilibrium) solutions of the equation?
   (b) For what values of y is y increasing?
   (c) For what values of y is y decreasing?
4. Use Euler's method with step size 0.5 to compute the approximate $y(5)$ of the solution of the initial-value problem
$$y' = y - 4x, \quad y(3) = 1.$$
5. Solve the initial value problem
$$xy^2y' = x^4 + 4, \quad y(1) = 1.$$
6. Evaluate the integral
$$\int_0^{\frac{\pi}{2}} x^2 \cos(2x)dx.$$
7. Evaluate the integral
$$\int 4\sin^4 x \cos^3 x dx.$$
8. Find the orthogonal trajectories of the family of curves.
$$y = \frac{k}{x^2}.$$