EXAM 1 - Math 17[1]

NAME:

I.D.:

Instruction: Circle your answers and show all your work **clearly**. Messing around may result in lossing credits, since the grader may be forced to pick the worst to grade. Solutions with answer only and without supporting procedures will have little credit. Partial credit will only be given to solutions that contain part of the procedure of a correct solution. **You may leave your answers in fractions or radicals without using calculators to convert them into decimals**.

1. (10 %) Eliminate the parameter in

$$x = \cos^4 t, \text{ and } y = \sin^4 t.$$

(Hint: Use $\sin^2 t + \cos^2 t = 1$. You may stop as soon as you get rid of the parameter t. Do not simplify your answer.)

2. (10 %) Write an equation of the tangent line to the given curve at the indicated point.

$$r = 1 + \sin\theta \text{ at } \theta = \frac{\pi}{3}.$$

For Problems 3 and 4, write down the correct integrals first to claim partial credit.

3. (10 %) Find the area of the region between the given curve and the x-axis.

$$x = e^t \text{ and } y = e^{-t};\ 0 \le t \le 10.$$

4. (10 %) Find the arc length of the given curve.

$$x = \ln(\cos t),\ y = t;\ 0 \le t \le \frac{\pi}{4}.$$

5. Suppose $\vec{a} =< 0, 3, 2 >$, $\vec{b} =< -3, 2, 0 >$ and $\vec{c} =< 2, 3, 0 >$.

(5.1) (10 %) Find $|\vec{a} + \vec{b} - 2\vec{c}|$. (Do not convert your answer to decimal approximates.)

(5.2) (10 %) Find $\text{comp}_{\vec{a}}\vec{b}$.

(5.3) (10 %) **Use dot product** to conclude if $\vec{a}, \vec{b}$ are perpendicular, and if $\vec{b}, \vec{c}$ are perpendicular. (No credit to answers with YES or NO only. You must justify your answers).

6. (10 %) Find the center and the radius of the sphere $x^2 + y^2 + z^2 - 8x + 10z + 6y + 49 = 0$.

7. Given points $P(1, 1, 1)$, $Q(1, 0, -1)$, $R(0, 1, -1)$ and $O(0, 0, 0)$,

(7.1) (10 %) find the area of the triangle with vertices P, Q and R.

(7.2) (10 %) find the volume of the parallelopiped with adjacent vectors $\vec{OP}$, $\vec{OQ}$ and $\vec{OR}$. (Do not convert your answers to decimal approximates).