MATH 126 C & D
Exam I
October 27, 2009

Name _____

Student ID #_____ Section _____

HONOR STATEMENT

"I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam."

SIGNATURE:_____

1	8	
2	8	
3	8	
4	8	
5	6	
6	6	
7	6	
Total	50	

- Your exam should consist of this cover sheet, followed by seven problems. Check that you have a complete exam.
- Show all work and justify your answers.
- Unless otherwise indicated, your answers should be exact values rather than decimal approximations. (For example, $\frac{\pi}{4}$ is an exact answer and is preferable to its decimal approximation 0.7854.)
- You may use a scientific calculator and one 8.5×11-inch sheet of handwritten notes. All other electronic devices (including graphing calculators) are forbidden.
- Turn your cell phone OFF and put it AWAY for the duration of the exam.

GOOD LUCK!

1. (8 points) Find parametric equations for the line of intersection of the planes

$$3x - 2y + z = 1 \qquad \text{and} \qquad 2x + y - 3z = 3.$$

2. (8 points) Let $\mathcal{P}$ be the plane that passes through the point $(3, 4, 3)$ and contains the line

$$x = 1 - 2t, y = 3t, z = -2 + t.$$

Find a vector $\vec{v}$ orthogonal to $\mathcal{P}$ that has length 10.

3. (8 points) Let ℓ be the line tangent to the curve

$$\vec{r}(t) = \langle 1 + 2\sqrt{t},\ t^3 + t,\ t^3 - t \rangle$$

at the point $(3, 2, 0)$. Find the point at which ℓ intersects the yz-plane.

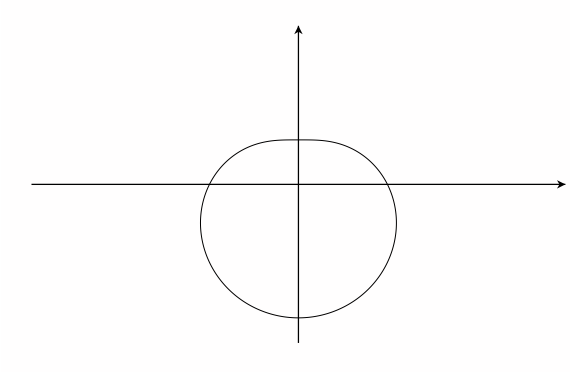
4. (8 points) Match each equation to the correct polar curve. (You do NOT need to show any work or justify your answers.)

   (a) $r = 3\sin\theta$

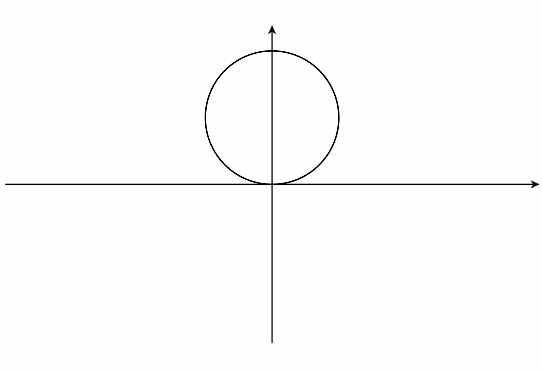
   (b) $r = \sin 3\theta$

   (c) $r = 2 - 2\sin\theta$

   (d) $r = 2 - \sin\theta$



ANSWER: _____



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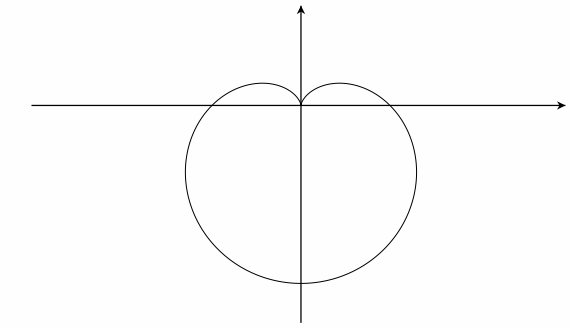
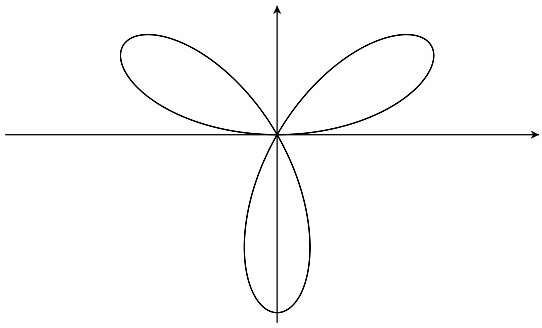


ANSWER: _____



ANSWER: _____

5. (6 points) Let $\vec{r}(t) = \langle 5\cos t, t, 3\sin t\rangle$. Compute $\vec{r}\,'(\pi)$, $\vec{r}\,''(\pi)$, and the curvature at $t = \pi$.

6. (6 points) A particle travels in the xy-plane so that its position (x, y) at time t is given by

$$x = 3\cos^2 t,\ y = -\sin^2 t.$$

Find the distance the particle travels on the interval $0 \leq t \leq 5\pi$.

7. (6 points)

   (a) Find an equation for the set of all points $P(x, y, z)$ such that the distance from P to the xy-plane is twice the distance from P to the point $A(2, -1, 3)$.

   (b) What type of surface does this set of points form (e.g., a sphere, a cylinder, a paraboloid, etc.)? (HINT: Reduce your equation to one of the standard forms to justify your answer.)