Math 126 G - Spring 2018
Midterm Exam Number One
April 26, 2018

Name: _____ Student ID no. : _____

Signature: _____

1	15	
2	9	
3	7	
4	7	
5	15	
6	7	
Total	60	

- This exam consists of **six** problems on **four** double-sided pages.
- Show all work for full credit.
- You may use a TI-30X IIS calculator during this exam. Other calculators and electronic devices are not permitted.
- You do not need to simplify your answers.
- If you use a trial-and-error or guess-and-check method when a more rigorous method is available, you will not receive full credit.
- Draw a box around your final answer to each problem.
- **Do not write within 1 centimeter of the edge!** Your exam will be scanned for grading.
- If you run out of room, write on the back of the first or last page and indicate that you have done so. If you still need more room, raise your hand and ask for an extra page.
- You may use one hand-written double-sided 8.5" by 11" page of notes.
- You have 80 minutes to complete the exam.

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1. **[5 points per part]**

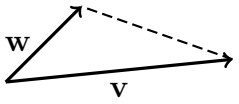
   (a) Write an equation for the plane through the points $(1, 6, 0)$, $(2, 4, -1)$, and $(1, 2, 4)$.

   (b) Find the (acute) angle between the plane from part (a) and the plane $4x - y + 3z = 0$.

   (c) Write parametric equations for the intersection of the two planes from (a) and (b).

2. **[3 points per part]** Suppose $\mathbf{v} \times \mathbf{w} = \langle 2, -3, 6 \rangle$.

(a) Find the area of this triangle:

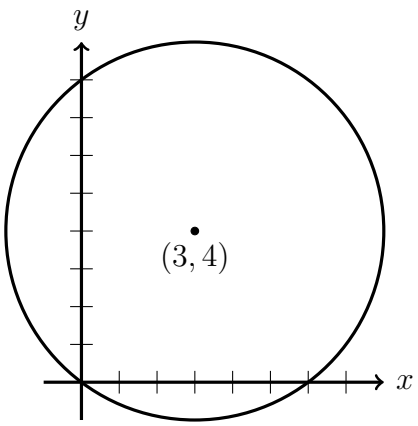


(b) Compute $\mathbf{w} \times \mathbf{v}$.

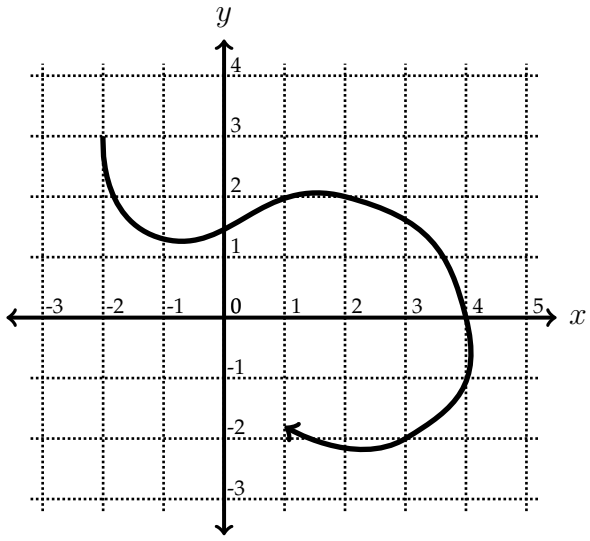
(c) Compute $(\mathbf{v} + \mathbf{v}) \times (\mathbf{v} + \mathbf{w})$.

3. **[7 points]** Write a polar equation for the following circle:

   Your answer should be in the form $r = f(\theta)$.



4. **[7 points]** Here's a drawing of the space curve of $\mathbf{r}(t) = \langle x(t), y(t), 0 \rangle$ in the xy-plane.



   Find $\mathbf{T}$ and $\mathbf{N}$ at the point $(3, -2, 0)$.

5. Consider the quadric surface $x^2 + 2y + z^2 + 2z = 4$.

(a) **[6 points]** Write the name for this surface.

(No credit for just writing an answer. Show your work.)

(b) **[9 points]** A particle travels along the path $\mathbf{r}(t) = \langle \sin(\pi t), 4 + t, \cos(\pi t) - 1 \rangle$.

Find the particle's tangential and normal components of acceleration at the time when it hits the surface.

6. **[7 points]** Are the following lines parallel, intersecting, or skew?

$$\frac{x-9}{2} = \frac{y-5}{3} = 3 - z$$

$$\begin{aligned} x &= -8 + 8t \\ y &= 5 - 5t \\ z &= 1 + 3t \end{aligned}$$