Math 126, Section A, Spring 2018, Midterm I

April 19, 2018

Name_____

TA/Section_____

Instructions.

- There are 4 questions. The exam is out of 40 points.
- You are allowed to use one page of notes written only on one side of the sheet in your own handwriting. **Hand in your notes with your exam paper.**
- You may use a TI 30X IIS calculator. Even if you have a calculator, give me exact answers. ($\frac{2\ln 3}{\pi}$ is exact, 0.7 is an approximation for the same number.)
- **Show your work**. If I cannot read or follow your work, I cannot grade it. You may not get full credit for a right answer if your answer is not justified by your work. If you continue at the back of a page, make a note for me. Please $\boxed{\text{BOX}}$ your final answer.

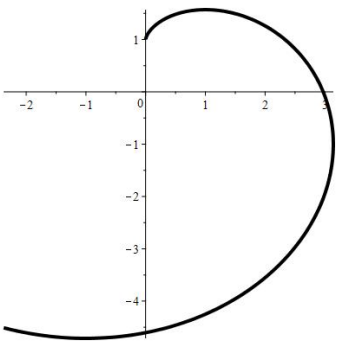
Question	points
1	
2	
3	
4	
Total	

1. Consider the following vector function

$$\mathbf{r}(t) = \langle \sin(t) - t\cos(t), \cos(t) + t\sin(t) \rangle , \quad t > 0.$$

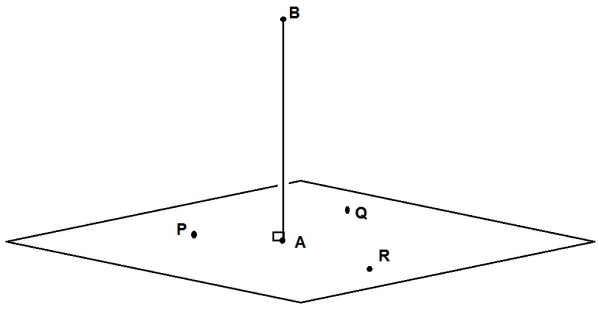
(a) (8 points) Compute the tangential and normal components of acceleration.

(b) (4 points) On the right is the graph of part of the curve $0 \leq t \leq 5$. Show $\mathbf{T}(4)$, $\mathbf{N}(4)$ and $\mathbf{a}(4)$ on the graph.



2. The line though the point $B(-2,3,1)$ perpendicular to the plane containing the points $P(1,2,3)$, $Q(0,-1,2)$ and $R(0,3,-1)$ intersects it at the point A as shown in the picture.

(a) (6 points) Find the equation of the plane and simplify.



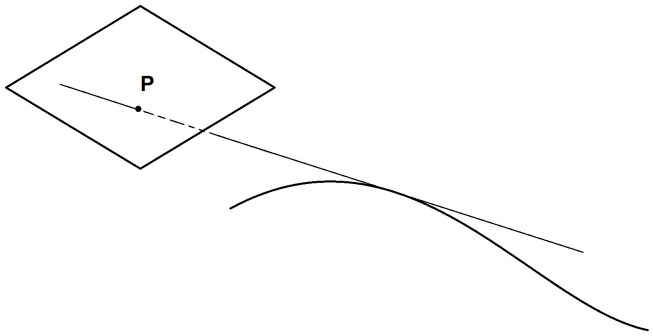
(b) (4 points) Find the coordinates of the point A.

(c) (2 points) Find the distance from the plane to the point B.

3. (10 points) The tangent line through the point with $t = 3$ to the curve

$$\mathbf{r}(t) = \langle t^2 + 1, 2t + 7, t^2 - t + 1 \rangle$$

intersects the plane $2x + 3y - 5z = 10$ at the point P as shown in the picture. Find the coordinates of the point P.



4. (6 points) The following curves are graphed with surfaces they are on.

A. $\mathbf{r}(t) = \langle \sin(t)\cos(14t), \sin(t)\sin(14t), \cos(t) \rangle$

B. $\mathbf{r}(t) = \langle t\cos(2t), t\sin(2t), t+1 \rangle$

C. $\mathbf{r}(t) = \langle 2\cos(t), 3\sin(t), 3 - 4\cos(t) - 9\sin(t) \rangle$

D. $\mathbf{r}(t) = \langle 2\cos(5t), 3\sin(5t), t \rangle$

E. $\mathbf{r}(t) = \langle \cos(3t), t, \sin(3t) \rangle$

F. $\mathbf{r}(t) = \langle t, t\sin(t), (t-1)^2 + 3 \rangle$

Under each picture, write down the letter of the curve and the equation of the surface it is on. For example: $\mathbf{G}, x + y^2 + z^3 = 1$. Use the curve equations to get the surface equations. You have to get both right to get the point for each part. The positive z-axis points up in all the pictures.