Math 32A - Winter 2019
Exam 1

Full Name: _____

UID: _____

Circle the name of your TA and the day of your discussion:

Qi Guo   Talon Stark   Tianqi (Tim) Wu

                Tuesday   Thursday

Instructions:

- Read each problem carefully.

- Show all work clearly and circle or box your final answer where appropriate.

- Justify your answers. A correct final answer without valid reasoning will not receive credit.

- Simplify your answers as much as possible.

- Include units with your answer where applicable.

- Calculators are not allowed but you may have a 3×5 inch notecard.

Page	Points	Score
1	30	
2	22	
3	30	
4	18	
Total:	100	

THIS PAGE LEFT INTENTIONALLY BLANK

You may use this page for scratch work. Work found on this page will not be graded unless clearly indicated in the exam.

1. (15 points) Find the equation of the plane that contains the following two lines.

$$\mathbf{r}(t) = \langle 2+t, 2+3t, 3+t \rangle$$
$$\mathbf{s}(t) = \langle 5+t, 15+4t, 10+2t \rangle.$$

2. (15 points) Describe in words and sketch a picture of the region in $\mathbb{R}^3$ represented by the following inequality. In addition to sketching the region in $\mathbb{R}^3$, sketch the $y = 0$ trace.

$$1 \le x^2 + \frac{z^2}{4} \le 4.$$

/30

3. (22 points) Consider the points $P = (-1, 8, 3)$, $Q = (2, 3, 0)$ and $R = (2, 5, -2)$.

   (a) The points P, Q, and R form a triangle. Which type of triangle is it? Circle one and justify your answer.

       i. Right

       ii. Isosceles

       iii. Right and isosceles

       iv. Equilateral

       v. None of the above

   (b) Determine whether the points P, Q, R, and $S = (0, 9, 3)$ all lie on a plane.

/22

4. (15 points) Find parametric equations for the tangent line to the curve defined by
$\mathbf{r}(t) = \langle 3\ln t, 2\sqrt{t}, t^2 \rangle$ at $t = 1$.

5. (15 points) Let $A = (-4, 0, 1)$ and $B = (0, 2, 5)$. Find the set of all points $P = (x, y, z)$ such that $\overrightarrow{AP}$ is orthogonal to $\overrightarrow{BP}$. Give a precise geometric description of your answer.

6. (18 points) Match each vector function with its space curve.
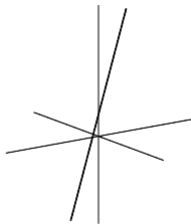
(a) $\mathbf{r}(t) = \langle \cos t, \sin t, t \rangle$ _____

(b) $\mathbf{r}(t) = \langle t, \sin t, \cos t \rangle$ _____

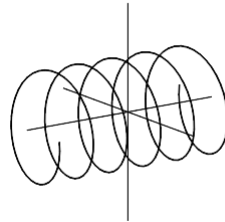(c) $\mathbf{r}(t) = \langle 3 - 2t, 3 - 2t, 1 + t \rangle$ _____

(d) $\mathbf{r}(t) = \langle e^{0.1t} \cos t, e^{0.1t} \sin t, t \rangle$ _____

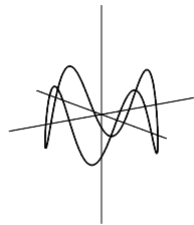(e) $\mathbf{r}(t) = \langle \cos t, \sin t, \cos(4t) \rangle$ _____

(f) $\mathbf{r}(t) = \left\langle t, -t, \dfrac{1}{1 + t^2} \right\rangle$ _____

(A)

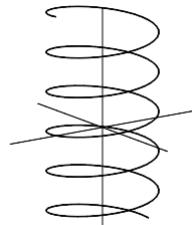(B)
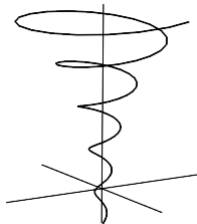
(C)

(D)

(E)

(F)

/18