Exam I Answers
Math 126 C Winter 2018

Version 1: In #1(b), you are asked to find vectors with magnitude 4.

1. (a) (1 points each) from top to bottom: S N S V S V

   (b) (4 points) $\frac{4}{\sqrt{5}}\mathbf{i} - \frac{8}{\sqrt{5}}\mathbf{k}$ and $-\frac{4}{\sqrt{5}}\mathbf{i} + \frac{8}{\sqrt{5}}\mathbf{k}$

2. (2 points each)

   (a) pair of lines

   (b) hyperbola

   (c) circle

   (d) circle

3. (3 points each)

   (a) $(-5\sqrt{3}, 5)$

   (b) $\left(-14, -\frac{\pi}{2}\right)$ (There are other correct answers.)

4. $13x + 18y - 2z = 50$

5. There are many correct ways to parameterize this curve. Different parameterizations will give different values of a_N and a_T. Here is one correct answer:

   $\mathbf{r}(t) = \langle 4\cos t, 4\sin t, 4\cos t + 4\sin t\rangle$, $a_N = 2\sqrt{6}$, $a_T = -2\sqrt{2}$

   Here is another:

   $\mathbf{r}(t) = \langle 4\sin t, 4\cos t, 4\sin t + 4\cos t\rangle$, $a_N = 2\sqrt{6}$, $a_T = 2\sqrt{2}$

6. (a) (7 points) $\mathbf{r}(t(s)) = \left\langle \sin\sqrt{\frac{2s}{5}} - \sqrt{\frac{2s}{5}}\cos\sqrt{\frac{2s}{5}}, \cos\sqrt{\frac{2s}{5}} + \sqrt{\frac{2s}{5}}\sin\sqrt{\frac{2s}{5}}, \sqrt{6}\cdot\frac{2s}{5}\right\rangle$

   (b) (2 points) $(\sin 2 - 2\cos 2, \cos 2 + 2\sin 2, 4\sqrt{6})$

Version 2: In #1(b), you are asked to find vectors with magnitude 7.

1. (a) (1 points each) from top to bottom: V S S N S V

   (b) (4 points) $\frac{21}{\sqrt{10}}\mathbf{i} - \frac{7}{\sqrt{10}}\mathbf{k}$ and $-\frac{21}{\sqrt{10}}\mathbf{i} + \frac{7}{\sqrt{10}}\mathbf{k}$

2. (2 points each)

   (a) circle

   (b) circle

   (c) pair of lines

   (d) hyperbola

3. (3 points each)

   (a) $(-4\sqrt{3}, 4)$

   (b) $\left(-21, -\frac{\pi}{2}\right)$ (There are other correct answers.)

4. $8x + 7y + 13z = 47$

5. There are many correct ways to parameterize this curve. Different parameterizations will give different values of a_N and a_T. Here is one correct answer:

   $\mathbf{r}(t) = \langle 3\cos t, 3\sin t, 3\cos t + 3\sin t \rangle$, $a_N = \frac{3\sqrt{3}}{\sqrt{2}}$, $a_T = -\frac{3}{\sqrt{2}}$

   Here is another:

   $\mathbf{r}(t) = \langle 3\sin t, 3\cos t, 3\sin t + 3\cos t \rangle$, $a_N = \frac{3\sqrt{3}}{\sqrt{2}}$, $a_T = \frac{3}{\sqrt{2}}$

6. (a) (7 points) $\mathbf{r}(t(s)) = \left\langle \sin\sqrt{\frac{2s}{5}} - \sqrt{\frac{2s}{5}}\cos\sqrt{\frac{2s}{5}}, \cos\sqrt{\frac{2s}{5}} + \sqrt{\frac{2s}{5}}\sin\sqrt{\frac{2s}{5}}, \sqrt{6}\cdot\frac{2s}{5} \right\rangle$

   (b) (2 points) $(\sin 2 - 2\cos 2, \cos 2 + 2\sin 2, 4\sqrt{6})$