Math 126, Sections C and D, Winter 2014, Midterm I

January 28, 2014

Name_____

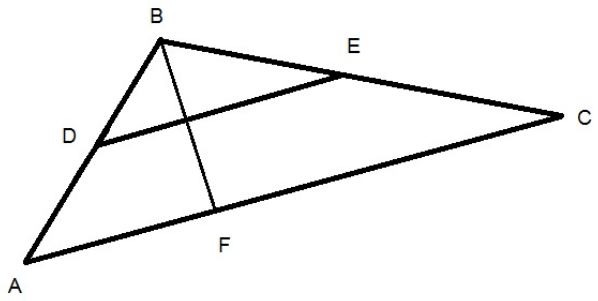
TA/Section_____

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 calculator which does not graph and which is not programmable. 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. In the triangle below, we know the coordinates of the points $A(1,5,7)$,$B(11,5,3)$ and $E(12,2,8)$. The point D is the midpoint of the line segment AB and the point E is the midpoint of the line segment BC. The line BF is perpendicular to the side AC.

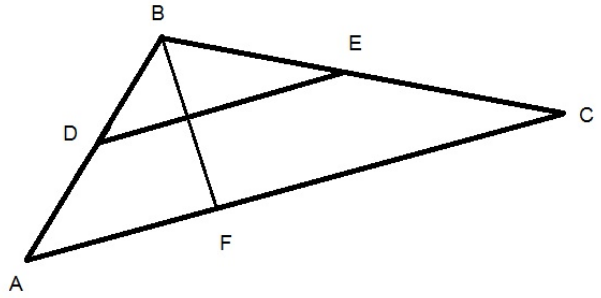


(a) (2 points) Find the coordinates of the point D.

(b) (2 points) Find the coordinates of the point C.

(c) (3 points) Find the coordinates of the point F.

$A(1, 5, 7)$, $B(11, 5, 3)$, $E(12, 2, 8)$



(d) (3 points) What is the area of the triangle?

(e) (2 points) Is the line DE parallel to the line AC?

2. (10 points) Find the equation of the plane which contains the two parallel lines

$$x = 3 + 2t \qquad y = 7 - 2t \qquad z = 6 + 4t$$

and

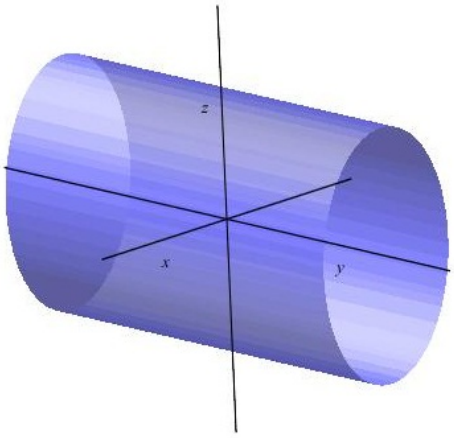
$$x = -4 + t \qquad y = 12 - t \qquad z = 2 + 2t.$$

Give your answer in the form $Ax + By + Cz = D$. When you are done, verify that your plane contains the two lines.

3. (a) (4 points) The curve traced by the vector function

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

is contained in three of the four surfaces sketched below. Write down the equations of the three surfaces which DO contain the curve and put an X under the surface which does NOT contain the curve.



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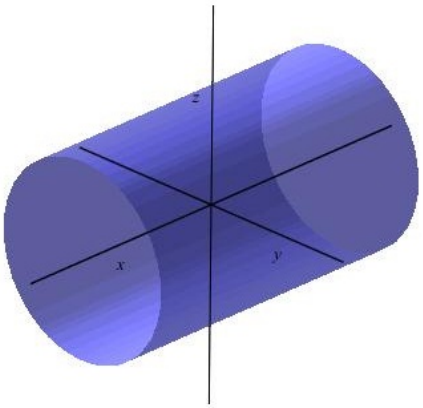

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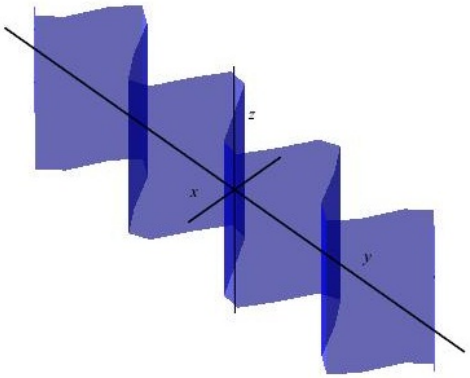

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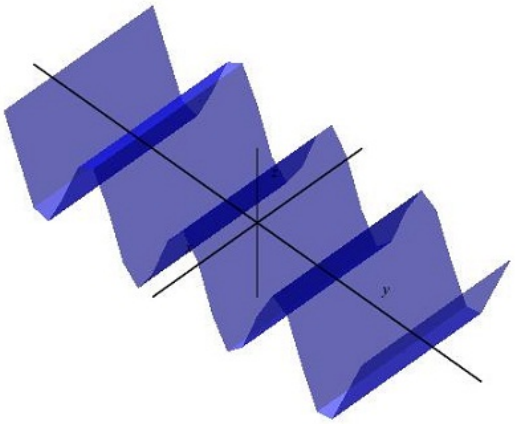

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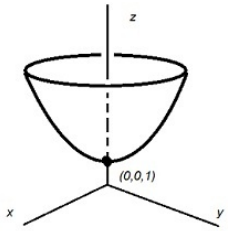
(b) (4 points) Identify the surface given by the equation

$$4x^2 - 24x + 100y^2 - 25z^2 - 50z = 89.$$

Use the terminology of surfaces from Section 12.6. Either sketch the surface or descrobe its orientation.

For example, write "$x^2 + y^2 = 5z - 5$ is an elliptic paraboloid which opens up in the positive z direction with its lowest point at (0,0,1)" or sketch



elliptic paraboloid

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4. Given the curve

$$x = \cos(2\pi t) \qquad y = \sin(2\pi t) \qquad z = 3 - t^{3/2},$$

(a) (5 points) Find the parametric equations of the tangent line to the curve at the point when $t = 4$.

(b) (5 points) Compute the length of the curve from the point where $t = 0$ to the point where $t = 8$.