Minitest 1 - MTH 2410

Dr. Graham-Squire, Fall 2012

Name: _____

I pledge that I have neither given nor received any unauthorized assistance on this exam.

_____

(*signature*)

DIRECTIONS

1. Show all of your work and use correct notation. A correct answer with insufficient work or incorrect notation will lose points.
2. Clearly indicate your answer by putting a box around it.
3. Cell phones and computers are <u>not</u> allowed on this test. Calculators <u>are</u> allowed on all parts of the test, however you should still show all of your work.
4. Give all answers in exact form, not decimal form (that is, put π instead of 3.1415, $\sqrt{2}$ instead of 1.414, etc) unless otherwise stated.
5. Make sure you sign the pledge.
6. Number of questions = 7. Total Points = 45.

1. (6 points) Let $\mathbf{u} = \langle 0, 2, 3 \rangle$, $\mathbf{v} = \langle -1, 0, 4 \rangle$ and $\mathbf{w} = \langle 2, -3, 0 \rangle$. Calculate the following expressions. If the expression does not exist or does not make sense, explain why.

   (a) $(\mathbf{u} \times \mathbf{v}) \times \mathbf{w}$

   (b) $(\mathbf{u} \cdot \mathbf{v}) \cdot \mathbf{w}$

2. (8 points) TRUE OR FALSE. Circle the correct answer. If false, give a counterexample or explain (briefly) why it is false.

(a) **True or False:** For any vectors $\mathbf{c}$ and $\mathbf{d}$, we find $\mathbf{c} \cdot \mathbf{d} = \mathbf{d} \cdot \mathbf{c}$.

(b) **True or False:** For any space vectors $\mathbf{u}$ and $\mathbf{v}$, $\mathbf{u} \times \mathbf{v} = \mathbf{v} \times \mathbf{u}$.

(c) **True or False:** If $\mathbf{a} \cdot \mathbf{b} = 0$ then either $\mathbf{a} = \mathbf{0}$ or $\mathbf{b} = \mathbf{0}$.

(d) **True or False:** Orthogonal planes can be described using the same normal vector.

3. (4 points) Find the distance between the point (1,8,5) and the plane $2x + y - z = 5$.

4. (4 points) Write a set of parametric equations that represent a line through the points (0,4,3) and (-1,2,5).

5. (6 points) Convert the given point or surface to the coordinate system specified.

(a) The surface $r^2 + z^2 - 9z = 0$ in cylindrical coordinates to spherical coordinates.

(b) Spherical coordinates $(12, \frac{\pi}{2}, 0)$ to Cartesian coordinates

No Calculator Name:_____

6. (10 points) Match the equation to the graph.

(a) $9x^2 - 6y^2 + 9z^2 = 36$

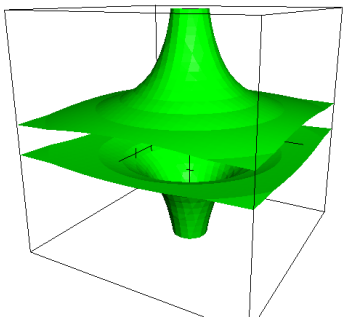
(b) $x^2 - 25y^2 = 9z^2 + 36$

(c) $y^2 + z^2 = 25$

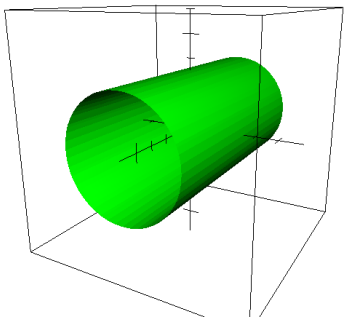
(d) $10y = 10z^2 - x^2$

(e) $x^2 + y^2 = \dfrac{1}{z^2}$

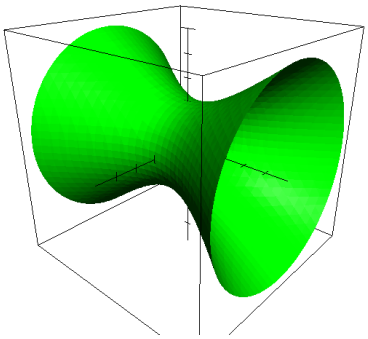
(i)



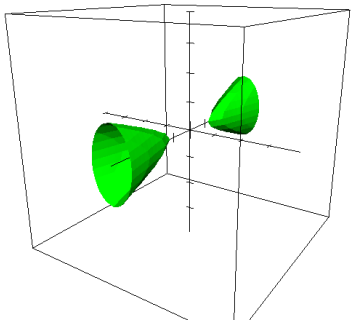
(ii)



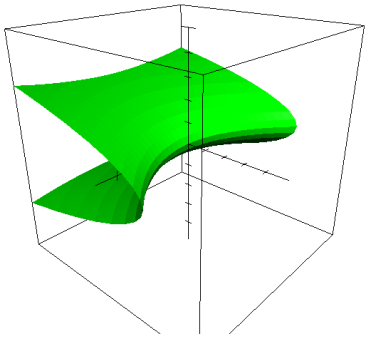
(iii)



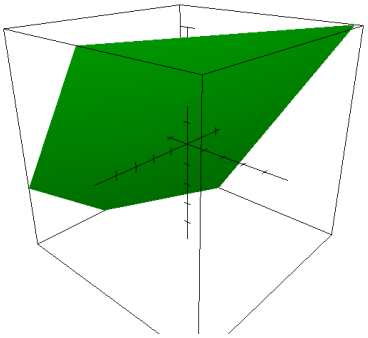
(iv)



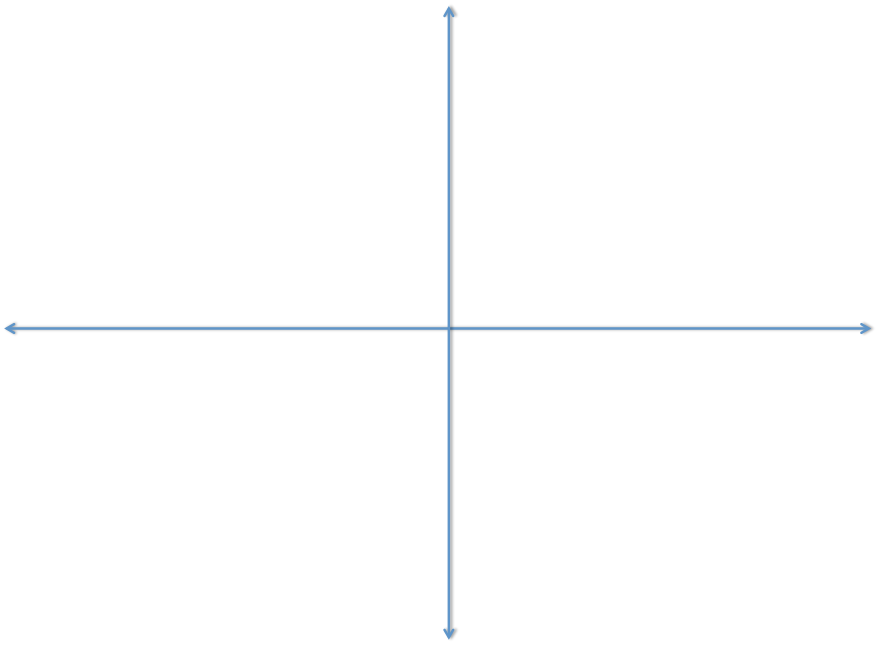
(v)



(vi)



7. (7 points) Sketch the surface given by the equation $x^2 + y^2 - 16z = 0$. You will need to add an x-axis to the graph below.



Extra Credit(1 point) Let $\mathbf{v} = \langle \mathbf{v_1}, \mathbf{v_2}, \mathbf{v_3} \rangle$ and c be a scalar. Prove that $||c\mathbf{v}|| = |\mathbf{c}|\,||\mathbf{v}||$.