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SM223 Performance Opportunity # 1 11 September 2007
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Given the vectors **A** = < 2, 1, 0 >, **B** = < 3, -1, 2 >, and **C** = < 4, 0, 3 >

1. Find:
   a. **A·B**

   b. The angle between **A** and **B**.

   c. $\text{comp}_{\mathbf{C}}\mathbf{B}$

2. Find:
   a. a vector perpendicular to **B**

   b. **A** X **C**

   c. True or False: | **A** X **B** | < | **A·B**|

3. Calculate:

   a. < 1, 0, 0 > X < 0, 1, 0 >

   b. < 0, 1, 0 > X < 1, 0, 0 >

   c. < 1, 0, 0 > X < 0, 0, 1 >

4. a. Let A = (2, 4, - 1) and B = (5, 0, 7) be two points in 3-space. Find the equation of the line through these 2 points.

   b. A plane goes through the point (2, 4, -1) and is parallel to the plane $5x + 2y - 3z = 6$. What is the equation of this plane?

5. a. What is the direction of the plane defined by $3x - 2y + z = 4$?

b. Consider the two planes: $P_1 : x + 2y + z = 5$ and $P_2 : x - 2y + z = 7$.

Which of these two planes is perpendicular to $3x - 2y + z = 4$

6. Determine whether the line $x = 3 + 8t$, $y = 4 + 5t$, and $z = -3 - t$ is parallel to the plane defined by $x - 3y + 5z = 12$. If it is not parallel, find the point of intersection of the plane and the line.

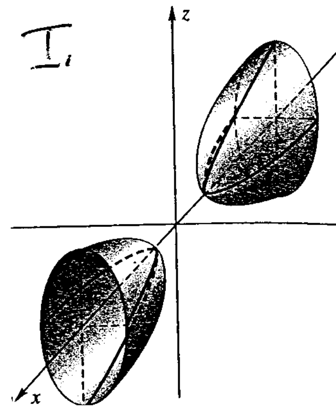
7. Match the equations with the sketches of the 3-D surfaces:

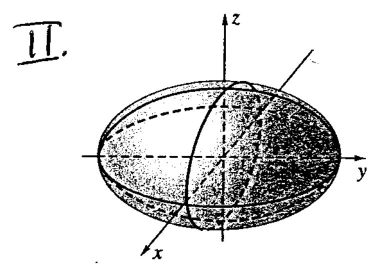
a. $z = \frac{x^2}{1} + \frac{Y^2}{4}$

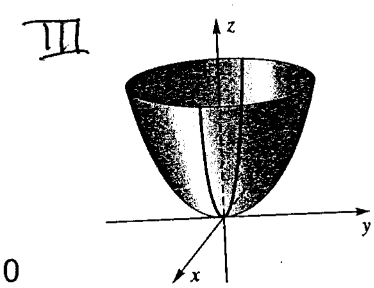
b. $\frac{x^2}{1} + \frac{y^2}{9} + \frac{z^2}{4} = 1$

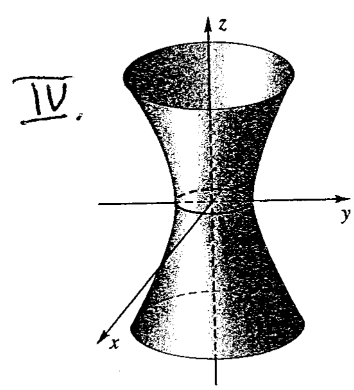
c. $\frac{x^2}{4} - \frac{y^2}{4} - \frac{z^2}{9} = 1$

d. $\frac{x^2}{4} + \frac{y^2}{4} - \frac{z^2}{9} = 1$









8. a. Sketch $2x + 5y + z = 10$

b. From the sketch below, find the equation of the plane of the form

$ax + by + cz = 12$ (i.e. find the values for a, b, and c).