Exam 12
Multi. Calculus

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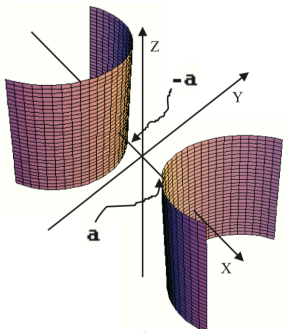
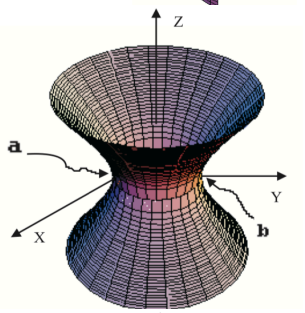
1. Find an equation of a plane that contains A(2, 3, 1), B(0, 1, -2), and C(4, 0, 1).

2. Match the given equations and surfaces

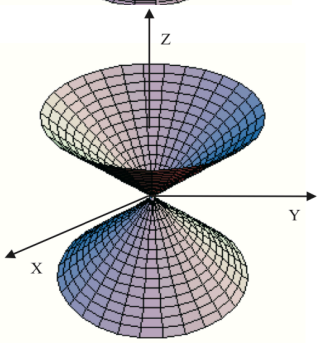
A $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1$ i.



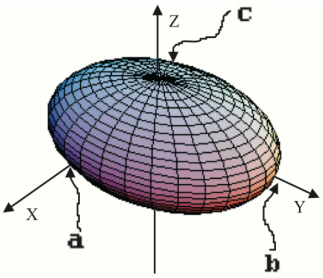
B $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ ii.



C $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ iii.



D $\frac{x^2}{a^2}+\frac{y^2}{b^2}=z^2$ iv.



3. Let $r(t) = < 5\cos t\,, 12\cos t\,, 13\sin t >$ at $t = 0$.
   a. Find T, unit tangent vector.
   b. Find N, unit normal vector.
   c. Find B, binormal vector.
   d. Find an equation of the osculating plane.
   e. Find κ, curvature.
   f. Find the length of the arc for $r(t)$ when $0 \le t \le \frac{\pi}{2}$.

4. Find the tangential and normal component of the acceleration vector.

$$r(t) = < \cos t\,, \sin t\,, t >$$

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5. Find the curvature of the curve with parametric equations

$$x = \int_0^t \sin\left(\frac{\pi}{2}\theta^2\right) d\theta \qquad\qquad y = \int_0^t \cos\left(\frac{\pi}{2}\theta^2\right) d\theta$$