

SI Session: Review Exam I
 Mondays: 1:30 PM – 3:00 PM
 Wednesdays: 4:50 PM – 6:20 PM
 Fridays: 1:00 PM – 2:30 PM
 Room 1239 SNAD

Prof. Stockton : Calculus III
 Fall 2008
 SI Leader : Neil Jody

[1] Match each equation to its graph (write the letter of the graph next to its equation).

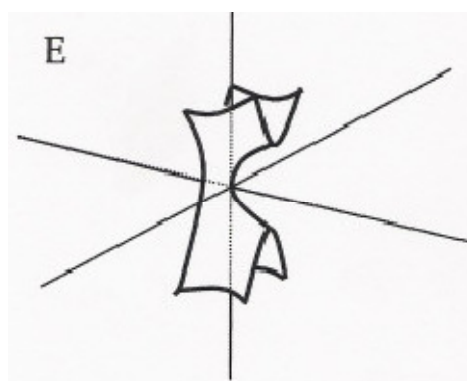
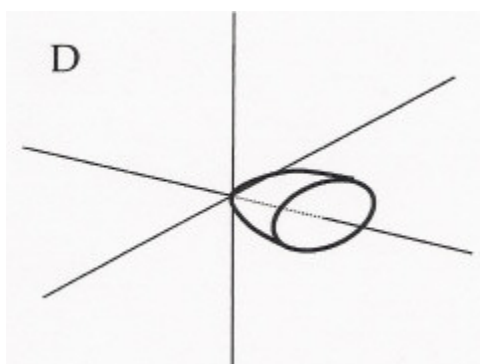
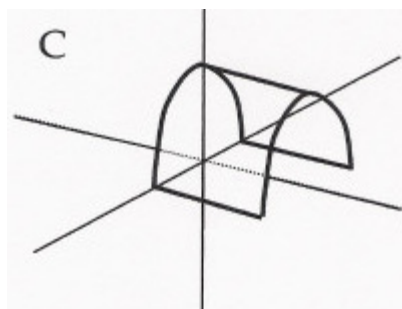
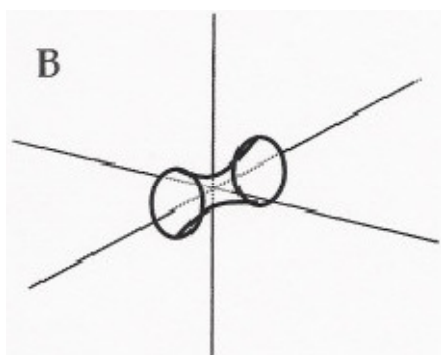
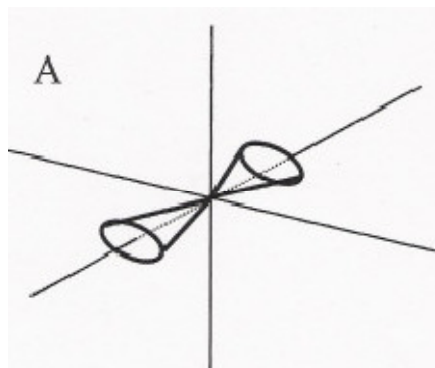
_____ $y = -x^2 + z^2$

_____ $-4x^2 + 9y^2 + 4z^2 = 36$

_____ $y = x^2 + 4z^2$

_____ $-4x^2 + 9y^2 + 4z^2 = 0$

_____ $z = 4 - x^2$



[2] Let $\vec{u} = \langle 1, 3, -4 \rangle$ and $\vec{v} = \langle 2, -2, 1 \rangle$.

(a) Calculate $\text{proj}_{\vec{u}} \vec{v}$.

(b) Calculate $\vec{u} \times \vec{v}$.

(c) Calculate $(2\vec{u} - 3\vec{v}) \cdot (\vec{u} + 4\vec{v})$.

(d) Calculate the area of the parallelogram with adjacent sides \vec{u} and \vec{v} .

[2] (continued from previous page)

(e) Find a vector that has the direction of \vec{u} and the length of \vec{v} .

(f) Determine the value of c so that the vector $\langle c, 1, -2 \rangle$ lies in the plane of \vec{u} and \vec{v} .

[3] To the nearest tenth of a degree, find the angle between the planes $x - y + 5z = 1$ and $-x + 3y - z = 2$.

- [4] Find the equation of the plane containing the points $(1, 0, 2)$, $(3, -2, -1)$, and $(2, 1, 1)$.

- [5] Find the length of the curve generated by $\vec{r}(t) = \left(2t, t^2, \frac{1}{3}t^3\right)$ where $0 \leq t \leq 3$.

- [6] Find parametric equations of the line tangent to the curve generated by $\vec{r}(t) = (e^{t-2}, t^2 - 1, \sqrt{t+2})$ at the point $(1, 3, 2)$.

- [7] Find the distance from the point $(-4, 1, 3)$ to the plane $2x - y + 3z = 6$.

[8] Find $\vec{r}(t)$ if $r'(t) = \langle 2t - 2, \sin t, e^t \rangle$ and $\vec{r}(0) = (3, 1, -3)$.

[9] The position of a particle at time t is given by the function
 $\vec{r}(t) = (\sin t, t^2 + 4t, -\cos t)$.

(a) At what time(s), if any, is the speed of the particle equal to 2 ?

(b) At what time(s), if any, will the velocity and acceleration vectors be orthogonal?

- [10] Evaluate the following limit: $\lim_{t \rightarrow 2} \left(t^2 \hat{i} - \frac{1}{t} \hat{j} + \cos(t-2) \hat{k} \right)$.
- [11] Determine if the point $(-1, 2, 6)$ lies on the line given by the parametric equations $x = -2 + 3t$, $y = 6t$, $z = 3 - 2t$.
- [12] Find the values of a and b so that $\vec{u} = \langle 2, -1, -5 \rangle$ and $\vec{v} = \langle a, b, -1 \rangle$ are parallel.

- [13] A particle is moving along the line containing the point $(1, 1, 2)$ with direction vector $\langle -1, 2, 1 \rangle$ at a speed of 4 units per second. The particle intersects the paraboloid $z = x^2 + y^2$ in exactly two points, P_1 and P_2 . How long does it take the particle to travel the distance between P_1 and P_2 ?