SI Session:February 16th,17th &19th, 2009
Mondays: 4:50 PM – 6:20 PM
Tuesdays: 1:30 PM – 3:00 PM
Wednesdays: 4:50 PM – 6:20 PM
Room 1245 SNAD

Prof. Stockton : Calculus III
Spring 2009
SI Leader : Neil Jody

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

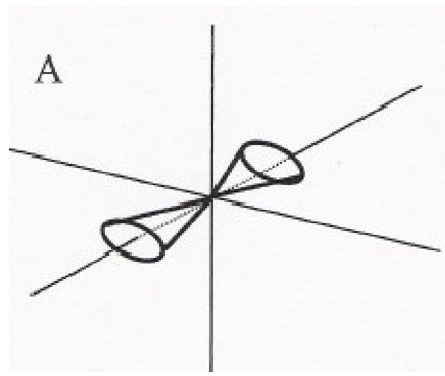
_______ $y = -x^2 + z^2$

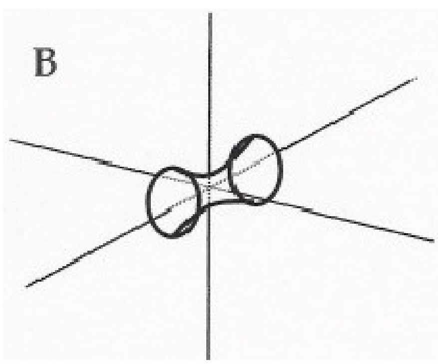
_______ $-4x^2 + 9y^2 + 4z^2 = 36$

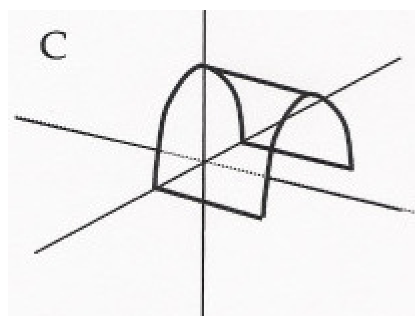
_______ $y = x^2 + 4z^2$

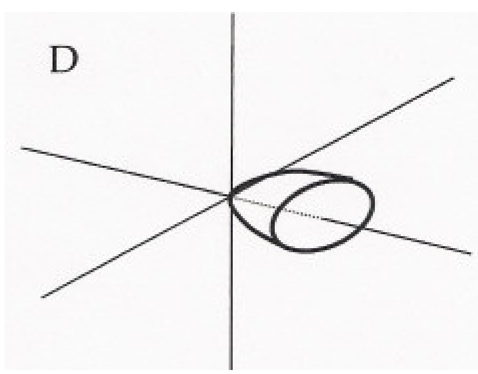
_______ $-4x^2 + y^2 + 4z^2 = 0$

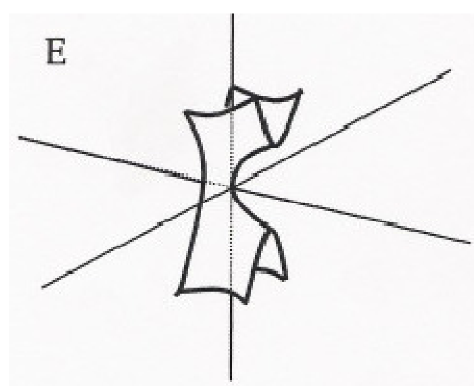
_______ $z = 4 - x^2$











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

(a) Calculate $proj_{\vec{u}}\vec{v}$.

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

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

(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 $0\le t\le 3$.

[6] Find parametric equations of the line tangent to the curve generated by $\vec{r}(t) = \left(e^{t-2}, t^2 - 1, \sqrt{t+2}\right)$ 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: $\lim_{t\to 2}\left(t^2\hat{\imath}-\frac{1}{t}\hat{\jmath}+\cos(t-2)\hat{k}\right)$.

[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?