Question 1 Pick 1 questions, 0 pts per question

Question

(3 points) 1. Determine the distance between the points $P(4, 3, -5)$ and $Q(-1, 2, 4)$.

Question

(3 points) 1. Determine the distance between the points $P(2, -3, 6)$ and $Q(-3, 2, 4)$.

Question 2 Pick 1 questions, 0 pts per question

Question

(3 points) 2. Find the parametric form of the equation of the line passing $P(2, 6, -3)$ and $Q(-4, 8, 2)$.

Question

(3 points) 2. Find the parametric form of the equation of the line passing $P\,(4,-3,2)$ and $Q\,(1,2,-4)$.

Question 3 Pick 1 questions, 0 pts per question

Question

3. Given the following vectors: $\vec{a} =< 6,2,-5 >$, $\vec{b} =< 3,-4,1 >$, and $\vec{c} =< 2,4,3 >$. Determine the following:

(2 points) a. $2\vec{a} - 5\vec{c}$

(2 points) b. $|\vec{a}|$

(3 points) c. $\vec{a} \cdot \vec{b}$

(2 points) d. The unit vector in the direction of $\vec{b}$

(4 points) e. $\vec{b} \times \vec{c}$

(3 points) f. $proj_{\vec{c}}\vec{a}$

(4 points) g. Find the area of the parallelogram determined by $\vec{a}$ and $\vec{b}$

Question

3. Given the following vectors: $\vec{a} =< 4,3,-6 >$, $\vec{b} =< 6,-1,2 >$, and $\vec{c} =< 3,2,4 >$. Determine the following:

(2 points) a. $4\vec{a} - 3\vec{c}$

(2 points) b. $|\vec{b}|$

(3 points) c. $\vec{a} \cdot \vec{b}$

(2 points) d. The unit vector in the direction of $\vec{a}$

(4 points) e. $\vec{a} \times \vec{b}$

(3 points) f. $proj_{\vec{c}}\vec{a}$

(4 points) g. Find the area of the parallelogram determined by $\vec{b}$ and $\vec{c}$

Question 4 Pick 1 questions, 0 pts per question

Question

(4 points) 4. Find the equation of the plane that passes through the points $P\,(4, 2, -1)$, $Q\,(3, 5, 1)$, and $R\,(1, -1, 3)$.

Question

(4 points) 4. Find the equation of the plane that passes through the points $P\,(3, 4, -2)$, $Q\,(4, 2, 5)$, and $R\,(2, -1, 4)$.

Question 5 Pick 1 questions, 0 pts per question

Question

(4 points) 5. A tow truck drags a stalled car along a road. The chain makes an angle of $50°$ with the road and the tension in the chain is 1200 N. How much work is done by the truck in pulling the car 2 km? Round your answer to the nearest tenth.

Question

(4 points) 5. A tow truck drags a stalled car along a road. The chain makes an angle of $40°$ with the road and the tension in the chain is 1500 N. How much work is done by the truck in pulling the car 3 km? Round your answer to the nearest tenth.

Question 6 Pick 1 questions, 0 pts per question

Question

(4 points) 6. Find the distance from the point $P\,(5,4,3)$ to the plane $2x+3y-4z=6$.

Question

(4 points) 6. Find the distance from the point $P\,(3,2,5)$ to the plane $2x+4y-3z=6$.

Question 7 Pick 1 questions, 0 pts per question

Question

(4 points) 7. Find the volume of the parallelepiped determined by the vectors $\vec{a}=<4,-1,2>$, $\vec{b}=<3,4,-1>$, and $\vec{c}=<1,2,5>$.

Question

(4 points) 7. Find the volume of the parallelepiped determined by the vectors $\vec{a}=<3,-2,5>$, $\vec{b}=<-1,3,2>$, and $\vec{c}=<2,5,1>$.

Question 8 Pick 1 questions, 0 pts per question

Question

(4 points) 8. Find the parametric form of the equation of the tangent line to the curve traced by the vector function $\vec{r}(t) = (2 - t^4)\hat{i} + (5t - 1)\hat{j} + (\ln t)\hat{k}$ when $t = 1$.

Question

(4 points) 8. Find the parametric form of the equation of the tangent line to the curve traced by the vector function $\vec{r}(t) = (2 - t^3)\hat{i} + (2t - 1)\hat{j} + (\ln t)\hat{k}$ when $t = 1$.

Question 9 Pick 1 questions, 0 pts per question

Question

(3 points) 9. Evaluate the following limit: $\lim_{x \to 0} \vec{r}(t)$ where
$\vec{r}(t) =< \sqrt{2 - t}, \cos 2t, \ln(t + 1) >$

Question

(3 points) 9. Evaluate the following limit: $\lim_{x \to 0} \vec{r}(t)$ where
$\vec{r}(t) =< \sqrt{2 - t}, (e^t - 1), \ln(t + 1) >$

Question 10 Pick 1 questions, 0 pts per question

Question

(5 points) 10. Find the length of the curve traced by

$\vec{r}(t) = (2t^{\frac{3}{2}})\hat{i} + (\cos 2t)\hat{j} + (\sin 2t)\hat{k}$ on $0 \leq t \leq 1$.

Question 11 Pick 1 questions, 0 pts per question

Question

11. Given the position vector $\vec{r}(t) = (6\sin 2t)\hat{i} + (6\cos 2t)\hat{j} + 5t\hat{k}$

(4 points) a. Find the unit tangent vector, $\hat{T}(t)$.

(4 points) b. Find the unit normal vector, $\hat{N}(t)$.

(4 points) c. Find the the binormal vector, $\hat{B}(t)$.

(4 points) d. Find the curvature, κ.

Question 12 Pick 1 questions, 0 pts per question

Question

(3 points) 12. Evaluate the following integral: $\int [(\cot t)\hat{i} + \frac{1}{t^2}\hat{j} + (\cos 3t)\hat{k}]dt$

Question

(3 points) 12. Evaluate the following integral: $\int [(\cot t\hat{i} + (\sin 4t)\hat{j} + \frac{1}{t^3}\hat{k}]dt$

Question 13 Pick 1 questions, 0 pts per question

Question

(3 points) 13. Evaluate the following integral:

$\int_0^1 [(t^2 \ln(t^3+1))\hat{i} + (e^{4t})\hat{j} + (3t^2+1)\hat{k}]dt$

Question 14 Pick 1 questions, 0 pts per question

Question

(4 points) 14. Given the acceleration vector $\vec{a}(t) = (t^2+4)\hat{i} + t\hat{j} + 2\hat{k}$. Find the position vector, $\vec{r}(t)$, given $\vec{r}(0) = \hat{i} + 3\hat{j}$ and $\vec{v}(0) = 2\hat{j} + 4\hat{k}$.

Question

(4 points) 14. Given the acceleration vector $\vec{a}(t) = (t^2+5)\hat{i} + t\hat{j} + 3\hat{k}$. Find the position vector, $\vec{r}(t)$, given $\vec{r}(0) = \hat{i} + 4\hat{j}$ and $\vec{v}(0) = 4\hat{j} + 2\hat{k}$.

Question 15 Pick 1 questions, 0 pts per question

Question

15. Given that the position vector $\vec{r}(t) = (80\sqrt{3})t\hat{i} + (96 + 80t - 16t^2)\hat{j}$ describes the motion of a projectile, where distance is measured in feet and time is measured in seconds.

(3 points) *a.* When does the projectile attain its maximum height?

(2 points) *b.* What is the maximum height that the projectile attains?

(3 points) *c.* When does the projectile hit the ground?

(2 points) *d.* What is the range of the projectile? (That is, what is the horizontal distance that the projectile travels?)

Question 16

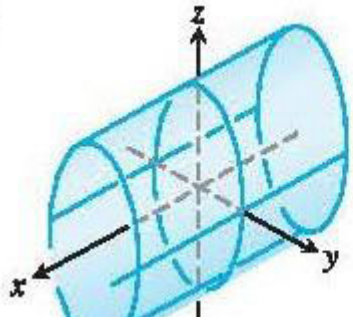
Pick 1 questions, 0 pts per question

Question

(1 point each) *16.* Match the number of the equation with the letter of the surface it defines.

1. $z^2 + x^2 - y^2 = 1$
2. $x^2 + y^2 + 4z^2 = 10$
3. $9x^2 + 4y^2 + 2z^2 = 36$
4. $9y^2 + z^2 = 16$
5. $x^2 + 4z^2 = y^2$
6. $x^2 + 2z^2 = 8$
7. $y^2 + z^2 = x^2$
8. $x = -y^2 - z^2$
9. $z^2 + 4y^2 - 4x^2 = 4$
10. $z = -4x^2 - y^2$

a.



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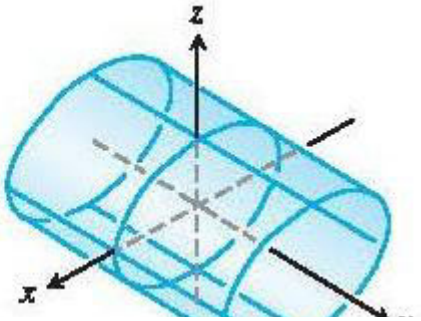

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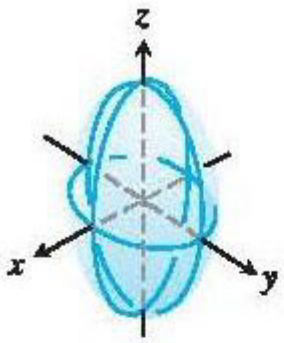

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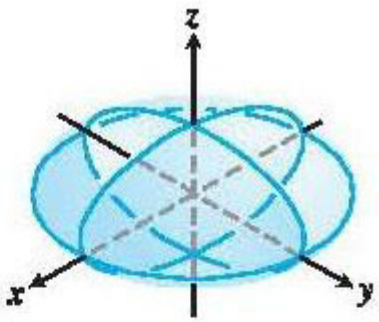

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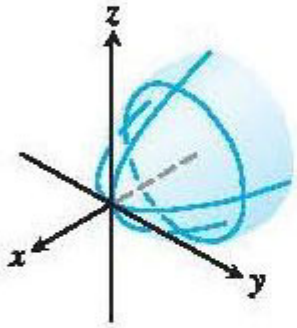

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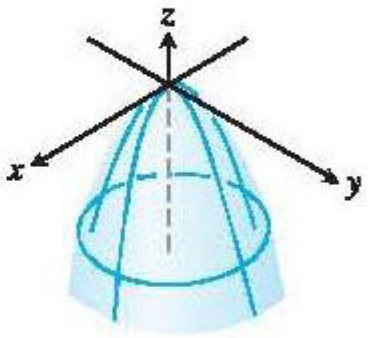

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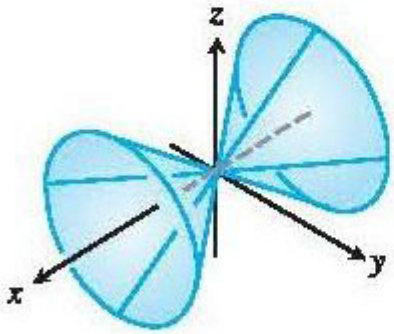

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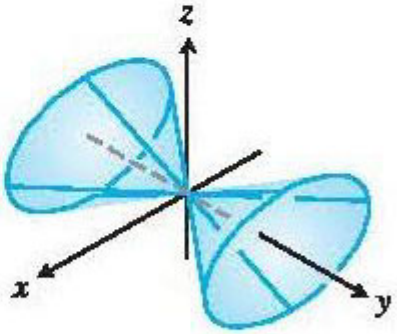

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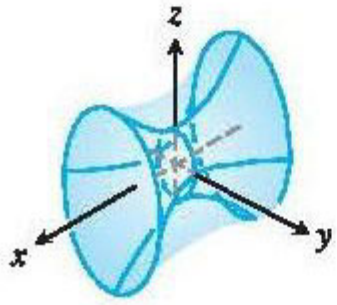

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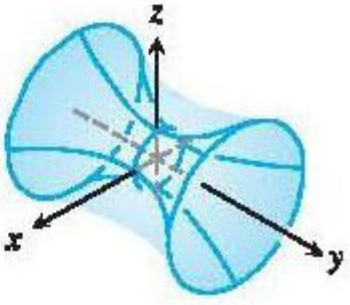

Question

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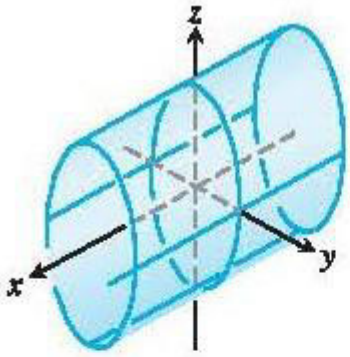
a.



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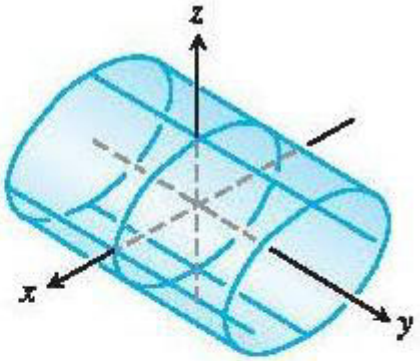

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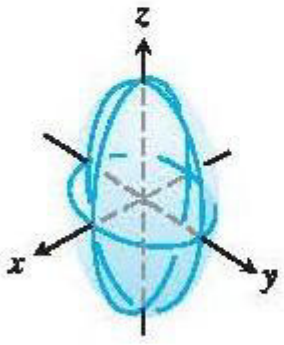

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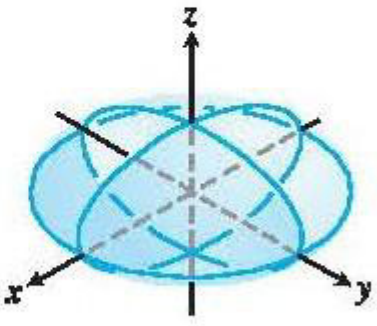

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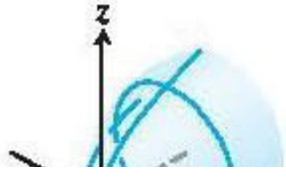

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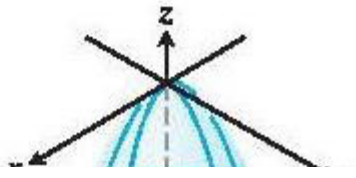

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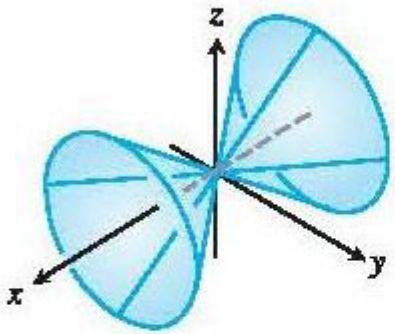

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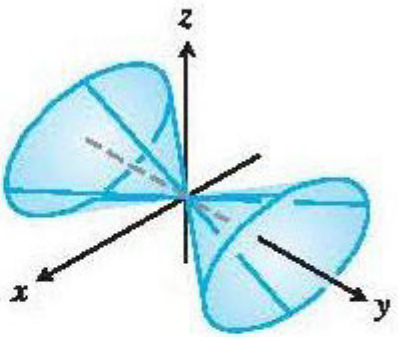

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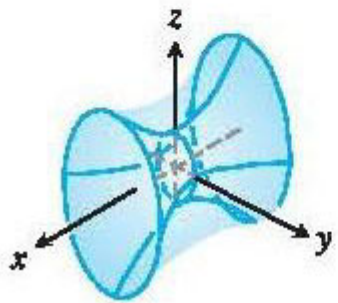

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