---

6. **(1 point)** `Library/Union/setMVvectors/vectors-12.pg`
The two vectors $\overline{u} = \langle 1,3,-3\rangle$ and $\overline{v} = \langle -2,-3,1\rangle$ determine a plane in space. Mark each of the vectors below as "**T**" if the vector lies in the same plane as $\overline{u}$ and "**F**" if not.

___ 1. $\langle -5,-9,5\rangle$
___ 2. $\langle 3,-2,-2\rangle$
___ 3. $\langle -1,-3,-1\rangle$
___ 4. $\langle 1,2,1\rangle$

---

7. **(1 point)** `Library/Union/setMVvectors/vectors-8.pg`
Suppose $\overline{u} = \langle 5,-3,-4\rangle$. Then

$\langle -2,3,5\rangle$ makes $\boxed{?}$ with $\overline{u}$
$\langle 4,-5,-3\rangle$ makes $\boxed{?}$ with $\overline{u}$
$\langle 8,0,10\rangle$ makes $\boxed{?}$ with $\overline{u}$
$\langle -4,5,-2\rangle$ makes $\boxed{?}$ with $\overline{u}$

---

8. **(1 point)** `Library/Union/setMVvectors/vectors-11a.pg`
Find a vector $\overline{v}$ that is perpendicular to the plane through the points

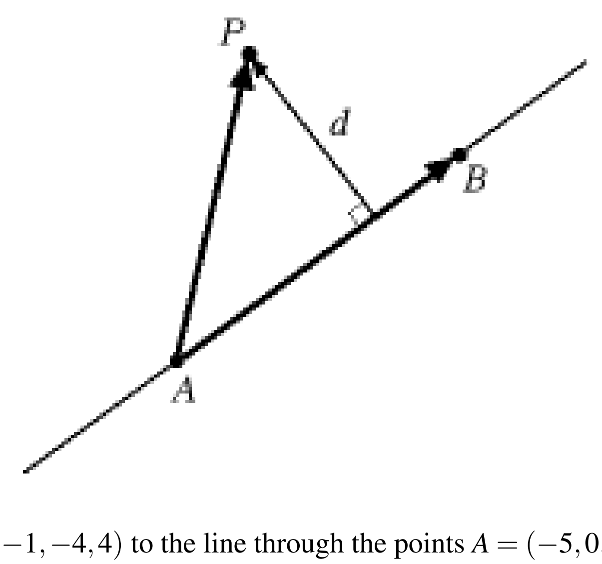
$$A = (-4,1,5),\ B = (5,1,2),\ \text{and } C = (0,4,4).$$

$\overline{v}$ = ____________________.

---

9. **(1 point)** `Library/Union/setMVvectors/an12_3_25/an12_3_25b.pg`

The distance d of a point P to the line through points A and B is the length of the component of $\overline{AP}$ that is orthogonal to $\overline{AB}$, as indicated in the diagram.



So the distance from $P = (-1,-4,4)$ to the line through the points $A = (-5,0,1)$ and $B = (-4,1,-2)$ is ____________.

11. **(1 point)** `Library/Union/setMVlinesplanes/planes-1.pg`

The planes $3x+5y+5z=-40$ and $4y-2x+5z=-36$ are not parallel, so they must intersect along a line that is common to both of them. The vector parametric equation for this line is

$$L(t) = \underline{\hspace{3cm}}.$$

---

12. **(1 point)** `Library/Union/setMVlinesplanes/an12_5_17a.pg`

Give a vector parametric equation for the line through the point $(5,-3)$ that is perpendicular to the line $\langle 4+4t, 5+2t \rangle$:

$$L(t) = \underline{\hspace{3cm}}.$$

---

13. **(1 point)** `Library/Union/setMVlinesplanes/an12_5_17.pg`

Give a vector parametric equation for the line through the point $(2,2,0)$ that is parallel to the line $\langle 4-3t, 2t-5, 5-t \rangle$:

$$L(t) = \underline{\hspace{3cm}}.$$

---

14. **(1 point)** `Library/Union/setMVlinesplanes/an12_6_11.pg`

An implicit equation for the plane passing through the points $(0,4,-5)$, $(4,1,-1)$, and $(2,-1,-3)$ is ____________________.

---

15. **(1 point)** `Library/Union/setMVlinesplanes/an12_6_24.pg`

An implicit equation for the plane passing through the point $(5,0,2)$ that is perpendicular to the line $L(t) = \langle 1+4t, t-2, 1 \rangle$ is ____________________.

---

16. **(1 point)** `Library/Union/setMVlinesplanes/an12_6_17.pg`

The line $L(t) = \langle 2t-5, 4t-5, 1+t \rangle$ intersects the plane $2x+4y-z=7$ at the point _______________ when $t =$ __________.

---

18. **(1 point)** `Library/OSU/accelerated_calculus_and_analytic_geometry_ii/hmwk7/prob12.pg`

Given a the vector equation $\mathbf{r}(t) = (-5+5t)\mathbf{i} + (0+1t)\mathbf{j} + (-2+2t)\mathbf{k}$, rewrite this in terms of the parametric equations for the line.

$x(t) =$ _____
$y(t) =$ _____
$z(t) =$ _____

---

25. **(1 point)** `Library/UMN/calculusStewartET/s_12_1_15.pg`

Answer the following questions about the sphere whose equation is given by

$$x^2+y^2+z^2-10x+4y=-4.$$

---

1. Find the radius of the sphere.
Radius: $r =$ __________
2. Find the center of the sphere. **Write the center as a point (a,b,c) where a, b, and c are numbers.**
Center: __________

---

30. **(1 point)** `Library/UMN/calculusStewartET/s_12_3_38.pg`

Find the scalar and vector projections of $\mathbf{b}$ onto $\mathbf{a}$, where $\mathbf{a} = \langle -1,1,2 \rangle$ and $\mathbf{b} = \langle -2,8,14 \rangle$.

---

1. $\mathrm{comp}_{\mathbf{a}}\mathbf{b} =$ __________
2. $\mathrm{proj}_{\mathbf{a}}\mathbf{b} =$ __________

---

31. (1 point) `Library/UMN/calculusStewartET/s_12_4_26.pg`
Suppose we have the triangle with vertices $P(1,6,1)$, $Q(-3,6,-4)$, and $R(5,2,2)$. Answer the following questions.

1. Find a non-zero vector orthogonal to the plane through the points P, Q, and R.
Answer: ________
2. Find the area of the triangle $\triangle PQR$.
Area: ________

35. (1 point) `Library/UMN/calculusStewartET/s_12_3_20.pg`
Find the angle θ between the vectors $\mathbf{a} = 6\mathbf{i} - \mathbf{j} - 4\mathbf{k}$ and $\mathbf{b} = 2\mathbf{i} + \mathbf{j} - 2\mathbf{k}$.
Answer (in radians): $\theta =$ ________

38. (1 point) `Library/UMN/calculusStewartET/s_12_1_14.pg`
Find an equation of the sphere that passes through the origin and whose center is $(-2,1,5)$. *Be sure that your formula is monic.*
Equation: ____________ $= 0$

48. (1 point) `Library/UMN/calculusStewartET/s_12_1_22.pg`
Find an equation of the largest sphere with center $(4,3,6)$ and is contained in the first octant. *Be sure that your formula is monic.*
Equation: ____________ $= 0$

50. (1 point) `Library/UMN/calculusStewartET/s_12_2_26.pg`
Find a vector $\mathbf{a}$ that has the same direction as $\langle -8,9,8 \rangle$ but has length 5.
Answer: $\mathbf{a} =$ ________

52. (1 point) `Library/UMN/calculusStewartET/s_12_5_42.pg`
Find the intercepts of the plane $5x + y + 9z = 45$. **Write your answers as points (a,b,c) where a, b, and c are numbers.**

1. The x-axis intercept.
Answer: ________
2. The y-axis intercept.
Answer: ________
3. The z-axis intercept.
Answer: ________

Note: *If there is no intersection, write "none".*

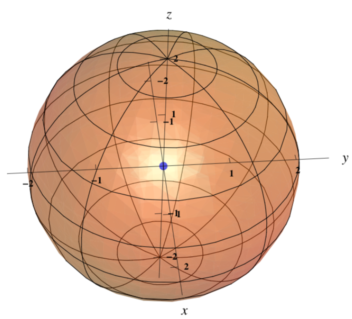
54. (1 point) `Library/UMN/calculusStewartET/s_12_1_10.pg`
Find the distance from $(-3,7,-14)$ to each of the following:

1. The xy-plane.
Answer: ________
2. The yz-plane.
Answer: ________
3. The xz-plane.
Answer: ________
4. The x-axis.
Answer: ________

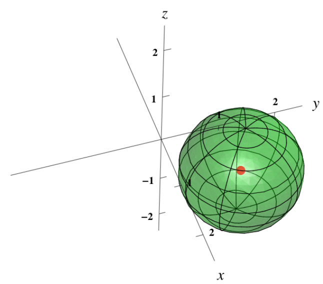
5. The y-axis.
Answer: ________
6. The z-axis.
Answer: ________

---

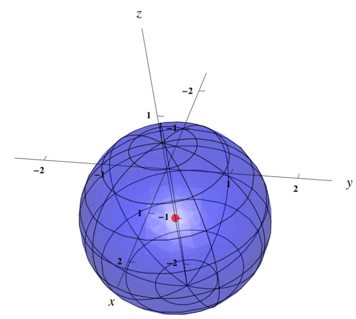
56. **(1 point)** `Library/UMN/calculusStewartET/s_12_1_prob01/s_12_1_prob01.pg`
Match the equations of the spheres with one of the graphs below.



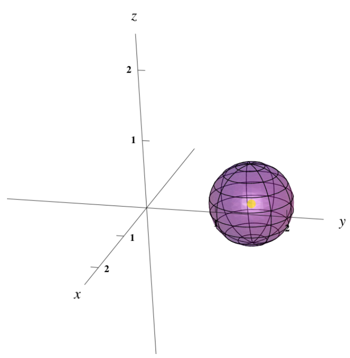
A



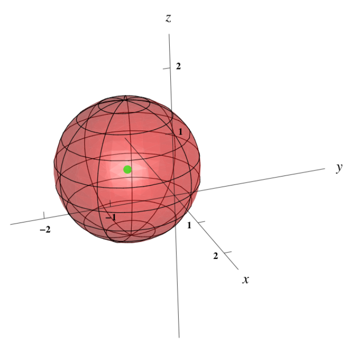
B



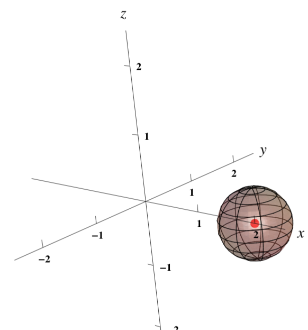
C



D



E



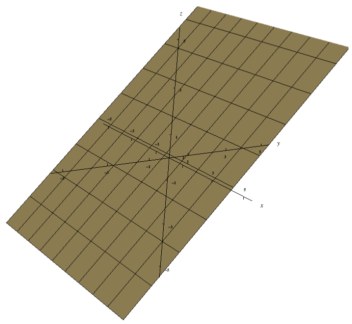
F

___ 1. $x^2 - 4x + y^2 + z^2 = -\frac{15}{4}$
___ 2. $(x-1)^2 + (y-1)^2 + z^2 = 1$
___ 3. $x^2 - 4x + y^2 - 4y + z^2 - 2z = -\frac{35}{4}$
___ 4. $x^2 - 2x + y^2 + 2y + z^2 - 2z = -2$

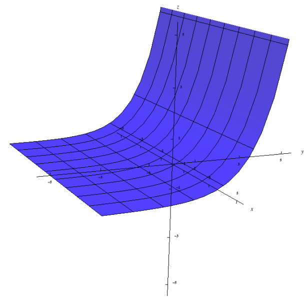
Note: *You can click on the graphs to enlarge the images.*

---

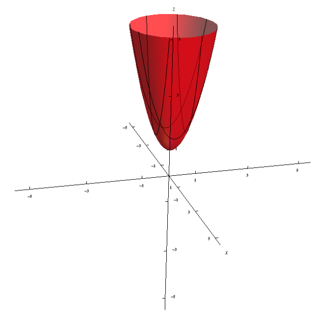
58. **(1 point)** `Library/UMN/calculusStewartET/s_14_1_23/s_14_1_23.pg`
Match each function with one of the graphs below.



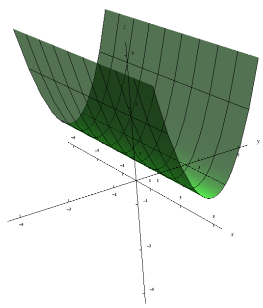
A



B



C



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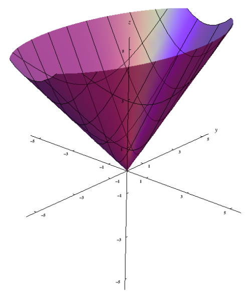
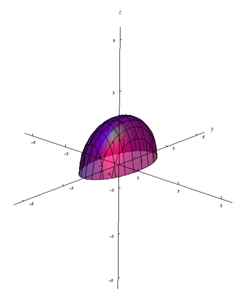


E



F

___ 1. $f(x,y) = \sqrt{4x^2 + y^2}$
___ 2. $f(x,y) = \sqrt{4 - 4x^2 - y^2}$
___ 3. $f(x,y) = y^2 + 1$
___ 4. $f(x,y) = e^{-y}$

Note: *You can click on the graphs to enlarge the images.*

---

63. **(1 point)** `Library/Rochester/setVectors2DotProduct/UR_VC_1_15.pg`

Let $\mathbf{a} = (-3, 2, 7)$ and $\mathbf{b} = (1, 2, 8)$ be vectors.

(A) Find the scalar projection of $\mathbf{b}$ onto $\mathbf{a}$.

Scalar Projection: ______________

(B) Decompose the vector $\mathbf{b}$ into a component parallel to $\mathbf{a}$ and a component orthogonal to $\mathbf{a}$.

Parallel component: (__________,
__________,
__________)
Orthogonal Component: (__________,
__________,
__________)

---

67. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_5.pg`

What are the spherical coordinates of the point whose rectangular coordinates are $(1,\ 2,\ 3)$?

ρ = ____________________
θ = ____________________
ϕ = ____________________

---

68. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_4.pg`
What are the rectangular coordinates of the point whose spherical coordinates are $\left(1, \frac{1}{6}\pi, -\frac{1}{6}\pi\right)$?

$x =$ ____________________
$y =$____________________
$z =$____________________

---

69. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_7.pg`
Match the given equation with the verbal description of the surface:

A. Half plane
B. Circular Cylinder
C. Cone
D. Elliptic or Circular Paraboloid
E. Plane
F. Sphere

___1. $\rho = 4$
___2. $\rho\cos(\phi) = 4$
___3. $r = 4$
___4. $\phi = \frac{\pi}{3}$
___5. $r^2 + z^2 = 16$
___6. $\theta = \frac{\pi}{3}$
___7. $z = r^2$
___8. $r = 2\cos(\theta)$
___9. $\rho = 2\cos(\phi)$

---

70. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_3.pg`
What are the cylindrical coordinates of the point whose rectangular coordinates are $(x = -4,\ y = 4,\ z = -5)$?

r = __________
θ = __________
z = __________

---

71. **(1 point)** `Library/Rochester/setVectors5Coordinates/urvc_3_6.pg`

What are the cylindrical coordinates of the point whose spherical coordinates are $(1,\ 2,\ \frac{1\pi}{6})$?

r = ____________________
θ = ____________________

z= ____________________

---

85. (1 point) `Library/272/setStewart12_5/problem_19.pg`

Find the distance from the point (3, -5, -1) to the plane $-5x+5y-4z=4$.

____

---

86. (1 point) `Library/272/setStewart12_5/problem_5.pg`
Find the vector and parametric equations for the line through the point $P=(3,-4,-5)$ and the point $Q=(2,-9,-1)$.

Vector Form: $\mathbf{r}=\langle$_____, _____, -5 $\rangle + t\langle$ _____, _____, 4 $\rangle$

Parametric form (parameter t, and passing through P when $t=0$):

$x=x(t)=$ _______________
$y=y(t)=$ _______________
$z=z(t)=$ _______________

---

102. (1 point) `Library/272/setStewart12_4/problem_5.pg`

Find the distance the point P(7, 2, -8), is to the plane through the three points

Q(2, 4, -3), R(4, 7, 2), and S(4, 8, -4).

____

---

110. (1 point) `Library/Hope/Multi1/01-05-Lines-planes/Lines-01.pg`
Find the distance between the skew lines $P(t)=(-4,3,5)+t\langle 1,-5,4\rangle$ and $Q(t)=(5,2,5)+t\langle 1,-5,-5\rangle$.
Hint: Take the cross product of the slope vectors of P and Q to find a vector normal to both of these lines.

distance = ____________________.

---

148. (1 point) `Library/FortLewis/Calc3/12-1-Two-variable-functions/HGM4-12-1-29-Functions-of-two-variables.pg`
Find a formula for the shortest distance from a point (a,b,c) to the y-axis.
distance = ____________________

---

149. (1 point) `Library/FortLewis/Calc3/12-1-Two-variable-functions/HGM4-12-1-28-Functions-of-two-variables.pg`
(a) Describe the set of points whose distance from the z-axis equals the distance from the xy-plane.

- A. A cylinder opening along the y-axis
- B. A cone opening along the y-axis
- C. A cone opening along the x-axis
- D. A cone opening along the z-axis
- E. A cylinder opening along the z-axis
- F. A cylinder opening along the x-axis

(b) Find the equation for the set of points whose distance from the z-axis equals the distance from the xy-plane.

- A. $x^2 + y^2 = r^2$
- B. $x^2 = y^2 + z^2$
- C. $x^2 + z^2 = r^2$
- D. $y^2 = x^2 + z^2$
- E. $z^2 = x^2 + y^2$
- F. $y^2 + z^2 = r^2$

---

164. (1 point) `Library/Michigan/Chap12Sec4/Q11.pg`
Find an equation for the plane containing the line in the xy-plane where $x = 3$, and the line in the yz-plane where $z = 4$.
equation: ________________

---

198. (1 point) `Library/Michigan/Chap17Sec5/Q11.pg`
For a sphere parameterized using the spherical coordinates θ and ϕ, describe in words the part of the sphere given by the restrictions

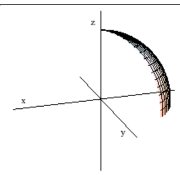
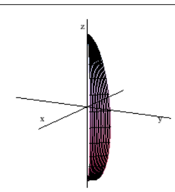
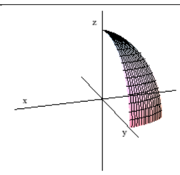
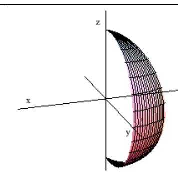
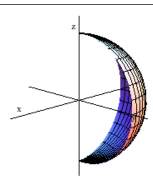
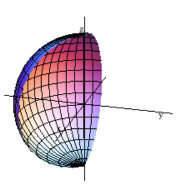
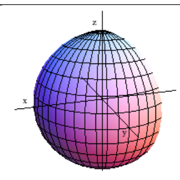
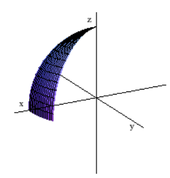
$$\pi/6 \le \theta \le \pi/4 \quad 0 \le \phi \le \pi$$

and

$$\pi/2 \le \theta \le \pi \quad 0 \le \phi \le \pi.$$

Then pick the figures below that match the surfaces you described.
$\pi/6 \le \theta \le \pi/4 \quad 0 \le \phi \le \pi$: [?/1/2/3/4/5/6/7/8]
$\pi/2 \le \theta \le \pi \quad 0 \le \phi \le \pi$: [?/1/2/3/4/5/6/7/8]

(Click on any graph to see a larger version.)

1.		**2.**		**3.**		**4.**	
5.		**6.**		**7.**		**8.**	

204. **(1 point)** `Library/maCalcDB/setVectors4PlanesLines/ur_vc_2_21.pg`

Match the surfaces with the appropriate descriptions.

___1. $z = 2x + 3y$
___2. $z = x^2$
___3. $x^2 + y^2 = 5$
___4. $z = 2x^2 + 3y^2$
___5. $z = y^2 - 2x^2$
___6. $x^2 + 2y^2 + 3z^2 = 1$
___7. $z = 4$

A. circular cylinder
B. ellipsoid
C. horizontal plane
D. elliptic paraboloid
E. hyperbolic paraboloid
F. parabolic cylinder
G. nonhorizontal plane