Donna Hooshmand **Math281-42344**
Assignment HW3 due 07/01/2020 at 11:59pm PDT

---

1. (1 point) Match the surfaces with the appropriate descriptions.

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

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

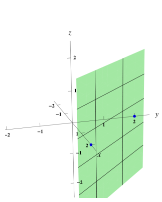
Answer(s) submitted:

- `B`
- `E`
- `D`
- `C`
- `G`
- `A`
- `F`

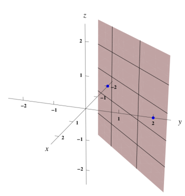
(correct)

---

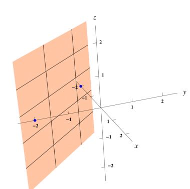
2. (1 point) Match the equations of the plane with one of the graphs below.



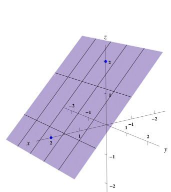
A



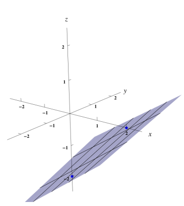
B



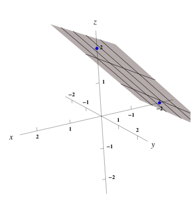
C



D



E



F

___ 1. $x + y = 2$
___ 2. $z - x = 2$
___ 3. $x + z = 2$
___ 4. $x - z = 2$

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

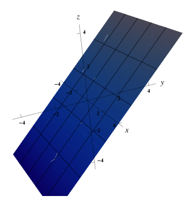
Answer(s) submitted:

- `A`
- `F`
- `D`
- `E`

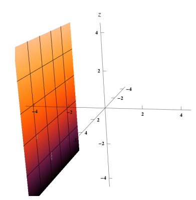
(correct)

---

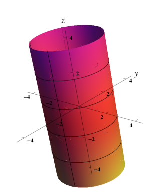
3. (1 point) Match the equations of the surface with one of the graphs below.



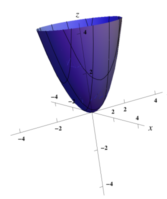
A



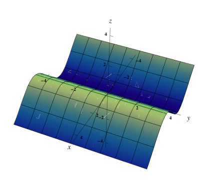
B



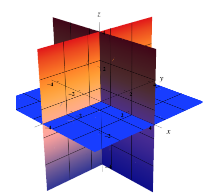
C



D



E



F

___ 1. $z = x^2 + y^2$
___ 2. $y = z$
___ 3. $y = -3$
___ 4. $xyz = 0$
___ 5. $z = \sin x$
___ 6. $x^2 + y^2 = 4$

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

Answer(s) submitted:

- `D`
- `A`
- `B`
- `F`
- `E`
- `C`

(correct)

4. (1 point)
State the type of the quadratic surface:
$\left(\frac{x}{2}\right)^2 - \left(\frac{y}{3}\right)^2 + \left(\frac{z}{2}\right)^2 = 1$
1. Ellipsoid
2. Hyperboloid of one sheet
3. Hyperboloid of two sheets
4. None of these
___
Describe the trace obtained by intersecting with the plane $z = 1$:
1. Ellipse
2. Hyperbola
3. Circle
4. Empty set
___

Answer(s) submitted:

- `2`
- `2`

(correct)

---

5. (1 point)
Find the limit:

$$\lim_{t\to 0}\langle \frac{e^{-9t}-1}{t}, \frac{t^8}{t^9-t^8}, \frac{-1}{10+t}\rangle$$

$\langle$ ____, ____, ____ $\rangle$
Answer(s) submitted:

- `-9`
- `-1`
- `-1/10`

(correct)

---

7. (1 point) Find a parametrization of the ellipse centered at the origin in the xy-plane that has major diameter 12 along the x-axis, minor diameter 8 along the y-axis, and is oriented counter-clockwise. Your parametrization should make the point $(6,0)$ correspond to $t = 0$. Use t as the parameter for all of your answers.
$x(t) =$ ______________
$y(t) =$ ______________
Answer(s) submitted:

- `6cos(t)`

(correct)

---

8. (1 point) Find a vector parametrization of the circle of radius 6 in the xy-plane, centered at the origin, oriented clockwise. The point $(6,0)$ should correspond to $t = 0$. Use t as the parameter in your answer.

$\vec{r}(t) =$ ______________
Answer(s) submitted:

- `<6cost, -6sint>`

(correct)

---

9. (1 point) Find a parametrization of the curve $x = -5z^2$ in the xz-plane. Use t as the parameter for all of your answers.

$x(t) =$ ______________
$y(t) =$ ______________
$z(t) =$ ______________
Answer(s) submitted:

- `-5t^2`

(correct)

---

10. (1 point) Find a parametrization of the circle of radius 8 in the xy-plane, centered at $(-3,5)$, oriented counterclockwise. The point $(5,5)$ should correspond to $t = 0$. Use t as the parameter for all of your answers.

$x(t) =$ ______________
$y(t) =$ ______________
Answer(s) submitted:

- `8cos(t) -3`

(correct)

---

11. (1 point) Find a vector function that represents the curve of intersection of the paraboloid $z = 7x^2 + 5y^2$ and the cylinder $y = 4x^2$. Use the variable t for the parameter.

$\mathbf{r}(t) = \langle t,$ __________, __________ $\rangle$
Answer(s) submitted:

- `4t^2`
- `7t^2+ 5(4t^2)^2`

(correct)

---

12. (1 point)

Find the parametric equations for the tangent line to the curve

$$x = t^5 - 1, y = t^4 + 1, z = t^1$$

at the point (242, 82, 3). Use the variable t for your parameter.

$x =$ ____________,
$y =$ ____________,
$z =$ ____________
Answer(s) submitted:

- `242 + 405 t`
- `82 + 108t`
- `3+t`

(correct)

13. (1 point)

For the given position vectors $\mathbf{r}(t)$,
compute the (tangent) velocity vector $\mathbf{r}'(t)$ for the given value of t .

A) Let $\mathbf{r}(t) = (\cos 4t, \sin 4t)$.
Then $\mathbf{r}'(\frac{\pi}{4})$= (______ , ______)?

B) Let $\mathbf{r}(t) = (t^2, t^3)$.
Then $\mathbf{r}'(4)$= (______ , ______)?

C) Let $\mathbf{r}(t) = e^{4t}\mathbf{i} + e^{-4t}\mathbf{j} + t\mathbf{k}$.

Then $\mathbf{r}'(0)$= ____ $\mathbf{i}$+ ____$\mathbf{j}$+ ____ $\mathbf{k}$?

Answer(s) submitted:

- `0`
- `-4`
- `8`
- `3*16`
- `4`
- `-4`
- `1`

(correct)

14. (1 point)

Find the derivative of the vector function

$$\mathbf{r}(t) = \ln(19 - t^2)\,\mathbf{i} + \sqrt{9+t}\,\mathbf{j} + 4e^{7t}\,\mathbf{k}$$

$\mathbf{r}'(t) = \langle$ __________, __________, __________ $\rangle$

Answer(s) submitted:

- `(-2t)/(19-t^2)`
- `1/(2(sqrt(9+t)))`
- `28e^(7t)`

(correct)

15. (1 point)

For the given position vectors $\mathbf{r}(t)$ compute the unit tangent vector $\mathbf{T}(t)$ for the given value of t .

A) Let $\mathbf{r}(t) = (\cos 5t, \sin 5t)$.
Then $\mathbf{T}(\frac{\pi}{4})$= (______ , ______)

B) Let $\mathbf{r}(t) = (t^2, t^3)$.
Then $\mathbf{T}(4)$= (________ , ________)

C) Let $\mathbf{r}(t) = e^{5t}\mathbf{i} + e^{-4t}\mathbf{j} + t\mathbf{k}$.
Then $\mathbf{T}(0)$= _____ $\mathbf{i}$+ _____$\mathbf{j}$+ _____ $\mathbf{k}$.

Answer(s) submitted:

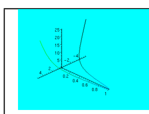
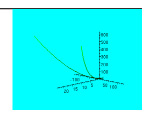
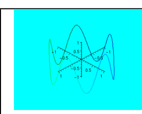
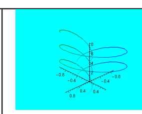
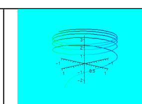
- `-sin(5pi/4)`
- `cos(5pi/4)`
- `8/sqrt(2368)`
- `48/sqrt(2368)`
- `5/sqrt(42)`
- `-4/sqrt(42)`
- `1/sqrt(42)`

(correct)

18. (1 point)

Match the parametric equations with the graphs labeled A - F. As always, you may click on the thumbnail image to produce a larger image in a new window (sometimes exactly on top of the old one).

__1. $x = \cos t, y = \sin t, z = \sin 5t$
__2. $x = \sin 3t \cos t, y = \sin 3t \sin t, z = t$
__3. $x = \cos 4t, y = t, z = \sin 4t$
__4. $x = t^2 - 2, y = t^3, z = t^4 + 1$
__5. $x = \cos t, y = \sin t, z = \ln t$
__6. $x = t, y = 1/(1+t^2), z = t^2$

				
A	B	C	D	E

Answer(s) submitted:

- `C`
- `D`
- `F`
- `B`
- `E`
- `A`

(correct)