

Multiple Choice Practice

2019

MATH 2400-004, CALCULUS III, FALL

Name:

- Find the angle between the vectors $\langle 1, 2, 3 \rangle$ and $\langle -5, 0, 2 \rangle$
 - $\arccos(\frac{11}{20})$
 - $\frac{\pi}{3}$
 - $\arccos(\frac{1}{\sqrt{406}})$
 - $\frac{\pi}{6}$
- Calculate the area of the triangle with vertices $(1, -1, 0)$, $(2, 2, 2)$ and $(-3, 1, 1)$
 - 4
 - $\frac{\sqrt{278}}{2}$
 - 2
 - $\sqrt{278}$
- Find the distance between the center of the sphere $x^2 + 4x + z^2 = 2y - y^2$ and the point $(2, -1, 0)$
 - $2\sqrt{10}$
 - $2\sqrt{5}$
 - $\sqrt{5}$
 - $\sqrt{10}$
- Which vector could lie on the same plane as $\langle 1, -1, 3 \rangle$ and $\langle -5, 0, 10 \rangle$?
 - $\langle 10, 0, 0 \rangle$
 - $\langle 1, 0, 2 \rangle$
 - $\langle 0, 0, 10 \rangle$
 - $\langle 1, 0, -2 \rangle$
- Find the line of intersection of the planes $x + y + z = 5$ and $2y - x - z = -1$
 - $\langle \frac{11}{3} - t, \frac{4}{3}, t \rangle$
 - $\langle t - \frac{11}{3}, \frac{4}{3}, t \rangle$
 - $\langle t, \frac{4}{3}t, 5 - 3t \rangle$
 - $\langle -t, 2t, t + \frac{4}{3} \rangle$

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

- (a) $(x - 4) - 11(y - 4) - 26z = 0$
- (b) $(x + 3) + 11(y - 1) - 26(z - 1) = 0$
- (c) $(x - 4) - 11(y - 4) = 0$
- (d) $(x + 1) + 11(y - 1) - 26(z - 2) = 0$

7. Find the distance between the line $\frac{x-1}{2} = \frac{y}{3} = \frac{z+2}{1}$ and the point $(1, 3, 2)$

- (a) 0
- (b) $\sqrt{13}$
- (c) $\sqrt{25 - \frac{169}{14}}$
- (d) $\sqrt{2 - \frac{1}{14}}$

8. Identify the surface $x - y^2 = z^2$.

- (a) Cone
- (b) Hyperbolic Paraboloid
- (c) Elliptic Paraboloid
- (d) Ellipsoid

9. Identify the surface $z^2 + y^2 - x^2 = -4$.

- (a) Hyperbolic Paraboloid
- (b) Hyperboloid of Two-Sheets
- (c) Hyperboloid of One-Sheet
- (d) Cone

10. Convert the point $(1, -1, 2)$ from rectangular coordinates into cylindrical coordinates.

- (a) $(\sqrt{2}, \frac{7\pi}{4}, 2)$
- (b) $(1, \frac{7\pi}{4}, 2)$
- (c) $(\sqrt{2}, \frac{\pi}{4}, 2)$
- (d) $(1, \frac{\pi}{4}, 2)$

11. Convert the point $(2, \pi, \frac{\pi}{4})$ from spherical coordinates into rectangular coordinates.

- (a) $(0, -\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$
- (b) $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0)$
- (c) $(-\frac{\sqrt{2}}{2}, 0, \frac{\sqrt{2}}{2})$
- (d) $(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}, 0)$

12. Calculate $\lim_{x \rightarrow 0} \left\langle \frac{x}{x+1}, e^x, \frac{x-1}{x^2-1} \right\rangle$.
- 2
 - $\langle 1, 1, 0 \rangle$
 - $\langle 0, 1, 1 \rangle$
 - Undefined
13. Let $\mathbf{s}(t) = \langle \ln(t^2), \cos(t), \tan(t) \rangle$. Find $\mathbf{s}'(t)$.
- $\langle \frac{2}{t}, \sin(t), \frac{1}{1+t^2} \rangle$
 - $\langle \frac{2t}{t^2}, -\sin(t), \sec^2(t) \rangle$
 - $\frac{2t}{t^2} - \sin(t) + \frac{1}{1+t^2}$
 - $\frac{2}{t} - \sin(t) + \sec^2(t)$
14. Let $\mathbf{s}(t) = \langle \frac{1}{1+t^2}, e^t, \sin(\pi t) \rangle$. Find $\int_0^1 \mathbf{s}(t) dt$.
- $\langle \frac{\pi}{4}, e - 1, \frac{2}{\pi} \rangle$
 - $\langle \frac{\pi}{2}, e, 0 \rangle$
 - $\langle 1, e, \frac{1}{\pi} \rangle$
 - $\langle \frac{\pi}{2}, e - 1, 0 \rangle$
15. Which of the following is a parametrization for the cylinder $y^2 + z^2 = 4$ from $x = 0$ to $x = 5$?
- $\langle x, r \cos(t), r \sin(t) \rangle$ with $0 \leq x \leq 5$, $0 \leq r \leq 2$, and $0 \leq t \leq 2\pi$
 - $\langle x, y, \sqrt{4-y^2} \rangle$ with $0 \leq x \leq 5$ and $-2 \leq y \leq 2$
 - Neither A nor B
 - Both A and B
16. Which of the following is the parametrization for the plane $x - y + 4z = 4$ within the cylinder $x^2 + z^2 = 1$
- $\langle x, y, 1 + \frac{y}{4} - \frac{x}{4} \rangle$ with $x^2 + y^2 \leq 4$
 - $\langle \cos(t), 4 - \cos(t) - 4 \sin(t), \sin(t) \rangle$ with $0 \leq t \leq 2\pi$
 - Neither A nor B
 - Both A and B
17. Determine the domain of $f(x, y) = \frac{\ln(x)}{\sqrt{4-y^2}}$
- $x > 0$ and $-2 \leq y \leq 2$
 - $x \neq 0$ and $-2 < y < 2$
 - $|x| > 0$ and $-2 \leq y \leq 2$
 - $x > 0$ and $-2 < y < 2$

18. Find $\frac{\partial f}{\partial x}$ of $f(x, y, z) = xz - \sin(y)$
- (a) 1
 - (b) $z - \sin(y)$
 - (c) $1 - \sin(y)$
 - (d) z
19. Find the tangent plane to $f(x, y) = x^3 - y + 2$ at the point $(2, 4, 6)$.
- (a) $12x - y - z = 12$
 - (b) $12x - y = 12 - z$
 - (c) $12x + y - z = 6$
 - (d) $2x + 4y + 6z = 0$
20. Find the tangent plane to the surface that contains the curves $\vec{r}_1(t) = \langle t, t^2, -1 \rangle$ and $\vec{r}_2(t) = \langle t^3, 1, t \rangle$ at the point $(-1, 1, -1)$.
- (a) $-x + y - z = 0$
 - (b) $2(x + 1) - (y - 1) + 6(z + 1) = 0$
 - (c) $2(x + 1) + (y - 1) - 6(z + 1) = 0$
 - (d) Not enough information
21. A mountain is modeled by the equation $f(x, y) = 4 - 2x^2 - y^2$. What is the steepest direction downhill from the point $(1, 0, 2)$?
- (a) $\langle -1, 0 \rangle$
 - (b) $\langle 1, 0 \rangle$
 - (c) $\langle -1, 2 \rangle$
 - (d) $\langle 1, 2 \rangle$
22. Determine the number of critical points for the equation $f(x, y) = 3xy - x^3 + y^2$.
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 0

23. Which of the following is not a possible λ -value for $f(x, y, z) = x^3 + y^3 + z^3$ subject to the constraint $x^2 + y^2 + z^2 = 1$ using the method of Lagrange multipliers?

- (a) $\frac{1}{2}$
- (b) $\frac{-3}{2}$
- (c) $\frac{3}{2}$
- (d) $\frac{3\sqrt{2}}{4}$

24. Let C be the positively-oriented smooth boundary curve of a region D in the xy -plane. If the area of D is 5, then find $\int_C \tilde{\mathbf{F}} \cdot d\tilde{\mathbf{r}}$ where $\tilde{\mathbf{F}}(x, y) = \langle e^x - 4y, \cos(y^2) + 2x - 1 \rangle$.

- (a) 30
- (b) 5
- (c) 10
- (d) Not enough information

25. Which of the following integrals could represent the surface area of the elliptic paraboloid $y = 4x^2 + 4z^2$ below the plane $y = 4$?

- (a) $\int_0^{2\pi} \int_0^1 \sqrt{64r^2 + 1} \, dr \, d\theta$
- (b) $\int_0^{2\pi} \int_0^2 \sqrt{64r^2 + 1} \, dr \, d\theta$
- (c) $\int_0^{2\pi} \int_0^2 r\sqrt{64r^2 + 1} \, dr \, d\theta$
- (d) $\int_0^{2\pi} \int_0^1 r\sqrt{64r^2 + 1} \, dr \, d\theta$

26. Which of the following integrals could represent the surface area of the cylinder $x^2 + y^2 = 1$ between the planes $z = 0$ and $z = 5$?

- (a) $\int_0^{2\pi} 5 \, dt$
- (b) $\int_0^{2\pi} \int_0^1 dr \, d\theta$
- (c) $\int_0^{2\pi} t \, dt$
- (d) $\int_0^{2\pi} \int_0^2 r \, dr \, d\theta$