7. Question *

(2 Points)

$z = e^x \cos(xy)$. Find the x − intercept of the equation of the tangent plane to the surface at $\left(1, \frac{\pi}{2}, 0\right)$

- $\pi e - 1$
- $\frac{1}{2}$
- πe
- -2
- 2
- $\pi - e$
- $\pi + e$
- e

In what direction does

$f(x, y) = xe^{y} + 3y$

have the minimum rate of

change at the point $(1, 0)$?

$\langle \sqrt{2}, \sqrt{2} \rangle$

$\langle 1, 2 \rangle$

$\langle -1, 3 \rangle$

$\sqrt{5}$

$\sqrt{5}$

$\langle 1, 1 \rangle$

$\langle 1, 0 \rangle$

14. Question *
(2 Points)

Let $f(x,y) = -\sqrt{4 - \frac{x^2}{9} - \frac{y^2}{4}}$.

Find the range of f.

- ○ $\mathbb{R}$
- ● $(-\infty, -2]$
- ○ $[-2, 2]$
- ○ $[0, 2]$
- ○ $[2, \infty)$
- ○ $[-2, 0]$
- ○ $[-3, 0]$
- ○ $[0, 1]$

15. Question *

(2 Points)

Given the function

$$f(x, y) = \sqrt{8 + 8x + 4y - 4x^2 + y^2}.$$

The level curves of $f(x, y)$ are

- ellipses
- hyperbolas
- tringles
- rectangles
- points
- lines
- paraboloids

14. Question *
(2 Points)

Let $f(x,y) = -x^2 - y^2 + 2x - 2y - 6$.
Which of the following statements best describes the point $(1,-1)$?

- $(1,-1)$ is a local min
- $(1,-1)$ is not a critical point
- $(1,-1)$ is a local max
- $(1,-1)$ is a saddle point
- $(1,-1)$ is an absolute min and local min
- $(1,-1)$ is an absolute max and local max

15 Question *

13. Question [2]
(2 Points)

Find the absolute minimum value of the function $f(x,y) = x^2 + 3y^2 + 2y$ on the unit disk $x^2 + y^2 \leq 1$.

- $-\frac{1}{3}$
- 0
- 6
- $\frac{1}{2}$
- 5
- -3
- 8
- 4

12. Question * [5]
(2 Points)

Find $\lim_{(x,y)\to(0,0)} \frac{x^3+y^3}{\sqrt{x}+\sqrt{y}}$

- 2
- $-\infty$
- -16
- does not exist
- -2
- 0
- ∞
- 16

11. Question *

(2 Points)

Let $f(x,y) = -\sqrt{4 - \frac{x^2}{9} - \frac{y^2}{4}}$.

Find the range of f.

- [0, 2]
- $[2, \infty)$
- [0, 1]
- [−2, 0]
- $(-\infty, -2]$
- [−2, 2]
- R
- [−3, 0]

(2 Points)

$$\text{Let } f(x,y) = \begin{cases} \dfrac{\cos(y)\sin(x)}{x} & : x \neq 0 \\ k+1 & : x = 0 \end{cases}$$

Find k that makes $f(x,y)$ continuous at the points $(0,0)$.

- $k = 4$
- $k = 0$
- $k = 6$
- $k = -3$
- $k = 2$
- $k = \frac{1}{7}$
- $k = \frac{5}{2}$
- $k = 7$

9. Question *

(2 Points)

Let $\vec{\mathbf{V}}f(2,3) = \langle 1, 1 \rangle$.

Find $\lim_{h \to 0} \dfrac{f\left(2 + \frac{h}{\sqrt{2}}, 3 + \frac{h}{\sqrt{2}}\right) - f(2,3)}{h}$.

- $\frac{3}{\sqrt{2}}$
- $\sqrt{7}$
- $2\sqrt{2}$
- $\frac{5}{\sqrt{2}}$
- $\sqrt{3}$
- $\sqrt{2}$
- -2
- $\frac{1}{\sqrt{2}}$

9. Question *

(2 Points)

Let $\vec{\nabla} f(2,3) = \langle 1, 1 \rangle$.

Find $\lim_{h \to 0} \dfrac{f\left(2 + \frac{h}{\sqrt{2}}, 3 + \frac{h}{\sqrt{2}}\right) - f(2,3)}{h}$.

- $\frac{3}{\sqrt{2}}$
- $\sqrt{7}$
- $2\sqrt{2}$
- $\frac{5}{\sqrt{2}}$
- $\sqrt{3}$
- $\sqrt{2}$
- -2
- $\frac{1}{\sqrt{2}}$

8. Question *

(2 Points)

Let $f(x,y) = 2xe^{-(x^2+y^2)}$. How many critical points $f(x,y)$ has?

- there is no critical points
- 9
- 5
- 1
- 2
- 3
- 4
- 6

6. Question * [5]
(2 Points)

If $w = f(x, y)$, where $x = x(t, \theta)$, $y = y(x, t)$, $t = t(\theta)$. Which formula below gives us $\frac{\partial w}{\partial \theta}$?

- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial y}\frac{\partial y}{\partial t}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial \theta}$
- $\frac{\partial w}{\partial \theta}\frac{\partial \theta}{\partial x} + \frac{\partial w}{\partial \theta}\frac{\partial \theta}{\partial y}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial \theta}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial t}\frac{dt}{d\theta}$
- $\frac{\partial w}{\partial y}\frac{\partial y}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial t}\frac{dt}{d\theta}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial \theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial t}$
- $\frac{\partial w}{\partial x}\frac{\partial x}{\partial t}\frac{dt}{d\theta} + \frac{\partial w}{\partial y}\frac{\partial y}{\partial t}\frac{dt}{d\theta}$

5. Question 5

(2 Points)

In what direction does $f(x,y) = xe^{-y} + 3y$ have the minimum rate of change at the point $(1,0)$?

- $(-1,3)$
- $(-1,-2)$
- $(1,2)$
- $(\sqrt{2},\sqrt{2})$
- $\sqrt{5}$
- $-\sqrt{5}$
- $(0,3)$
- $(2,0)$

4. Question *

(2 Points)

Suppose f is a differentiable function, and define $g(u, v) = f(3u - v, u^2 + v)$.

Find $\frac{\partial g}{\partial v}$ at $(u, v) = (2, -1)$ if

$f(2, -1) = 6$, $g(2, -1) = -7$,

$f_x(2, -1) = 1$, $f_y(2, -1) = 9$

$f(7, 3) = 4$, $g(7, 3) = 2$,

$f_x(7, 3) = -3$, $f_y(7, 3) = 5$

- 6
- -10
- -7
- 3
- 11
- 5
- 8

3. Question *

(2 Points)

Find $f_x(0,0)$ if

$f(x,y) = \sqrt[3]{8(x^3 - y^3)}$.

- ∞
- 0
- -2
- 4
- 2
- $-\infty$
- does not exist
- $\sqrt{5}$

2. Question *
(2 Points)

Find f_{xyyy} if

$$f(x,y) = \frac{y}{x + \ln(x)} - x^3y^2.$$

- 2
- $\frac{1}{x + \ln(x)}$
- 12
- 4
- does not exist
- 6
- -12
- 0

1. Question
(2 Points)

Find $\lim_{(x,y)\to(0,0)} \frac{3y^2 \sin(x)}{x^2 + y^2}$.

- does not exist
- −2
- 2
- 8
- 0
- −1
- 4
- 1