Differentiation

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Question 1

0/10 pts 3 19

Suppose that $f(x,y) = x^{-1}y^2$.

1. $\frac{\partial f}{\partial x}(x,y)$= ,
2. $\frac{\partial f}{\partial y}(x,y) =$,
3. $\frac{\partial f}{\partial x}(2,3) =$,
4. $\frac{\partial f}{\partial y}(2,3) =$,
5. The directional derivative of $f(x,y)$ in the directional (-3,3) and at the point $(x,y) = (-1,2)$ is .

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Question 2

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Suppose that $f(x,y) = xy$. The directional derivative of $f(x,y)$ in the directional (6,2) and at the point $(x,y) = (5,-3)$ is .

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Question 3 0/10 pts 3 19

Given $f(x, y) = \sin(x + y)$ where $x = s^6t^5, y = 6s - 5t$. Find

$f_s(x(s, t), y(s, t))$ =

$f_t(x(s, t), y(s, t))$ =

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Question 4 0/10 pts 3 19

Given $f(x, y) = 2x^2 + 3xy^4 - 4y^6$, find

$f_{xx}(x, y)$ =

$f_{xy}(x, y)$ =

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Question 5 0/10 pts 3 19

$f(x, y) = \sqrt{2x^2 + 2y^2}$

1. $f_x(1, 3)$ =
2. $f_y(0, 0) =$
3. $\lim_{(x,0) \to (0,0)} \dfrac{f(x, 0) - f(0, 0)}{x - 0}$ =

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Question 6

0/10 pts 3 19

Given $f(x, y) = 6x^2 + 2x^2y^4 - 2y^6$, find

$f_x(x, y)$ =

$f_y(x, y)$ =

$f_{xx}(x, y)$ =

$f_{xy}(x, y)$ =

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Question 7

0/10 pts 3 19

Given $f(x,y) = -5y + 4x\exp\left(\frac{x}{y}\right)$, find

$f(5x,5y) = f(x,y) \times$ _____

$f_x(x,y) =$

$f_y(x,y) =$

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Question 8 0/10 pts 3 19

Given $f(x,y) = \sqrt{x^2+y^2}$ where $x = s^3t^4, y = t^3s^4$. Find

$f_s(x(s,t),y(s,t)) =$

$f_t(x(s,t),y(s,t)) =$

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Question 9 0/10 pts 3 19

Given $f(x,y) = x + y$ where $x = s^2t^4, y = t^2s^4$. Find

$f_s(x(s,t),y(s,t)) =$

$f_t(x(s,t),y(s,t)) =$

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Question 10 0/10 pts 3 19

Suppose that $f(x,y) = x^1 \sin\left(\frac{\pi y}{3}\right)$. The directional derivative of $f(x,y)$ in the directional (1,2) and at the point $(x,y) = (3,1)$ is [ ] .

Also the tangent plane of $f(x,y)$ at $(3,1)$ is $z = a(x-3) + b(y-1) + c$ where $a =$ [ ] , $b =$ [ ] , $c =$ [ ]

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Question 11 0/10 pts 3 19

Suppose that
$z = \dfrac{x^3y^2}{x^6 + y^4}$ if $(x, y) \neq (0.0)$, and $z = 0$ if $(x, y) = (0, 0)$.

Then a) for $(x, y) \neq (0, 0)$:

1. $\dfrac{\partial z}{\partial x}$ = [ ] ;
2. $\dfrac{\partial z}{\partial y}$ = [ ] ;

b) for $(x, y) = (0, 0)$:

1. $\dfrac{\partial z}{\partial x}$ = [ ] ;
2. $\dfrac{\partial z}{\partial y}$ = [ ] ;

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Question 12 0/10 pts 3 19

Suppose that
$F(x, y, z) = xyz - 1 = 0$

Then

1. $\dfrac{\partial y}{\partial x}$ = [ ] ;
2. $\dfrac{\partial y}{\partial x}\dfrac{\partial z}{\partial y}\dfrac{\partial x}{\partial z}$ = [ ] ;
3. The tangent plane of $F(x, y, z)$ at $(x_0, y_0, z_0) = (1, 4, 0.25)$ is $G(x, y, z) = 0$ where $G(x, y, z) =$ [ ] ;

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Question 13

0/10 pts 3 19

Given $f(x,y) = \dfrac{-3xy}{5x^2+2y^2}$, find

$\lim_{x=y,\,x\to 0} f(x,y)$ =

$\lim_{x=-y,\,x\to 0} f(x,y)$ =

$\lim_{y=0,\,x\to 0} f(x,y)$ =

$\lim_{(x,y)\to(0,0)} f(x,y)$ =

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Question 14

0/10 pts 3 19

- Warning... unquoted string DNE.. treating as string

Given $f(x,y) = \dfrac{x^3y^1}{\sqrt{(3x^2+5y^2)^4}}$, find

$\lim_{x,y\to 0} f(x,y)$ =

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Question 15

0/10 pts 3 19

Suppose that

$f(x,y) = \dfrac{x^1 y^3}{\sqrt{x^2+y^2}^3}$ if $(x,y) \neq (0,0)$ and $f(0,0) = 0$.

Which of the following statement(s) about $\lim\limits_{x,y \to 0} \dfrac{x^1 y^3}{\sqrt{x^2+y^2}^3}$ is(are) true?

- [ ] discontinuous at (0,0)
- [ ] limit exists at (0,0)
- [ ] continuous at (0,0)
- [ ] limit exists at (1,1)

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Question 16 0/10 pts 3 19

Given

$f(x,y) = \dfrac{6x^3y + 5xy^2}{2x^2 + 3y^2}$ if $(x,y) \in R^2 - \{(0,0)\}$

and $f(0,0) = 0$.

Which statements about $f(x,y)$ in the following are right?

- ☐ $f(x,y)$ is continuous at $(0,0)$
- ☐ $f(x,y)$ is continuous
- ☐ $f(x,y)$ is continuous at $(3,2)$
- ☐ the limit of $f(x,y)$ at $(0,0)$ is 0
- ☐ $f(x,y)$ has limit at (0,0)

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Question 17 0/10 pts 3 19

Given

$f(x,y) = \dfrac{2x^2y + 3x^2y^4}{2x^4 + 6y^4}$ if $(x,y) \in R^2 - \{(0,0)\}$

and $f(0,0) = 0$.

Which statements about $f(x,y)$ in the following are right?

- ☐ $f(x,y)$ is continuous at $(0,0)$
- ☐ the limit of $f(x,y)$ at $(0,0)$ is 0
- ☐ $f(x,y)$ is continuous
- ☐ $f(x,y)$ is continuous at $(2,4)$
- ☐ $f(x,y)$ has limit at (0,0)

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Question 18 0/10 pts 3 19

Given
$f(x,y) = \dfrac{4x^2y + 2x^2y^1}{2x^4 + 3y^4}$ if $(x,y) \in R^2 - \{(0,0)\}$
and $f(0,0) = 0$.

Which statements about $f(x,y)$ in the following are right?

- ☐ $f(x,y)$ is continuous at $(2,1)$
- ☐ $f(x,y)$ is continuous at $(0,0)$
- ☐ $f(x,y)$ has limit at (0,0)
- ☐ $f(x,y)$ is continuous
- ☐ the limit of $f(x,y)$ at $(0,0)$ is 0

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Question 19 ☑ 0/10 pts ↺ 3 ⇄ 19

Suppose that
$f(x,y,z) = \dfrac{xyz}{x^2 + y^2 + z^2}$ if $(x,y,z) \neq (0,0,0)$ and $f(0,0,0) = 0$.
Which of the following statement(s) about $f(x,y,z)$ is(are) true?

- ☐ discontinuous at (0,0,0)
- ☐ continuous at (0,0,0)
- ☐ limit exists at (1,1,-1)
- ☐ limit exists at (0,0,0);

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Question 20 0/10 pts 3 19

Suppose that
$f(x,y,z) = \dfrac{xy+yz+zx}{x^2+y^2+z^2}$ if $(x,y,z) \neq (0,0,0)$ and $f(0,0,0) = 0$.
Which of the following statement(s) about $f(x,y,z)$ is(are) true?

- [ ] limit exists at (1,1,-1)
- [ ] discontinuous at (0,0,0)
- [ ] limit exists at (0,0,0);
- [ ] continuous at (0,0,0)

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Question 21 0/10 pts 3 19

Given $f(x,y) = \dfrac{\sqrt{x^2+y^2-3^2}}{y}$, and suppose that Ω is domain of $f(x,y)$;

1. The completment of Ω, i.e. region on $\mathbb{R}^2$ at which is lying oustside Ω, is

2. The range of $f(x,y)$ is an interval, I =

3. Find the statement(s) which is(are) True:
   - ☐ Ω is closed
   - ☐ None
   - ☐ Ω is a connected domain
   - ☐ Ω is open

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Question 22 0/10 pts 3 19

Given $f(x,y)=\dfrac{x-y}{x+y}$, and suppose that Ω is domain of $f(x,y)$;

1. The points, (x,y), at which is not lying in Ω, satisfis the equation:

2. The range of $f(x,y)$ is an interval, I =

3. Find the statement(s) which is(are) True:
   - ☐ Ω includes two open half planes
   - ☐ Ω is closed
   - ☐ Ω includes two closed half planes
   - ☐ None
   - ☐ Ω is open
   - ☐ Ω is a connected domain

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Question 23 0/10 pts 3 19

Given $f(x,y,z)=\dfrac{x}{\sqrt{2^2-x^2-y^2-z^2}}$, and suppose that Ω is domain of $f(x,y,z)$, and R is the range of $f(x,y,z)$;

1. The volume of Ω is [ ] .
2. The range of $f(x,y,z)$ is an interval, I = [ ]
3. Find the statement(s) which is(are) True:
   - ☐ Ω is a open cube
   - ☐ None
   - ☐ Ω is a half sphere but neither open nor closed
   - ☐ Ω is a open sphere
   - ☐ Ω is a open rectangle
   - ☐ Ω includes two connected composents in $\mathbb{R}^3$

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Question 24 0/10 pts 3 19

Given $f(x, y, z) = \sqrt{2^2 - x^2 - y^2 - z^2}$, and suppose that Ω is domain of $f(x, y, z)$, and R is the range of $f(x, y, z)$;

1. The volume of Ω is [ ] .
2. The range of $f(x, y, z)$ is an interval, I = [ ]
3. Find the statement(s) which is(are) True:
   - ☐ None
   - ☐ Ω is a open cube
   - ☐ Ω is a open rectangle
   - ☐ Ω is a open sphere
   - ☐ Ω is a half sphere but neither open nor closed
   - ☐ Ω is a closed sphere
   - ☐ Ω includes two connected composents in $\mathbb{R}^3$

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