Assignment T2Review-Optional due 10/26/2011 at 11:59pm MST

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1. (1 pt)

Find the differential of the function $w = x^5 \sin(y^7 z^6)$

$dw =$ ________ $dx+$ ________ $dy+$ ________ dz

Correct Answers:

- `5*x**(5-1) * sin(y**7 * z**6)`
- `7* x**5 * y**(7-1) * z**6 * cos(y**7 * z**6)`
- `6* x**5 * y**7 * z**(6-1) * cos(y**7 * z**6)`

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2. (1 pt) Find the equation of the tangent plane to the surface $z = e^{1x/17} \ln(1y)$ at the point $(-1, 2, 0.6535)$.

z = ____________________

Note: Your answer should be an expression of x and y; e.g. "5x + 2y - 3"

Correct Answers:

- `0.0384441094875705 * x + 0.471436571927437 * y + -0.250879173078606`

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3. (1 pt)

Find the directional derivative of $f(x,y,z) = 2x^2 + 1y^2 + 3z^2$ at the point (2, 3, -4) in the direction of the origin.

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Correct Answers:

- `-24.1403939630167`

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4. (1 pt)

Find the maximum rate of change of $f(x,y,z) = x + y/z$ at the point (5, -2, -1) and the direction in which it occurs.

Maximum rate of change: ____________________

Direction (unit vector) in which it occurs: $\langle$ ________, ________, ________ $\rangle$

Correct Answers:

- `2.44948974278318`
- `0.408248290463863`
- `-0.408248290463863`
- `0.816496580927726`

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5. (1 pt)

Find equations of the tangent plane and normal line to the surface $x = 5y^2 + 5z^2 - 318$ at the point (7, 1, -8).

Tangent Plane: (make the coefficient of x equal to 1).

____________________ $= 0$.

Normal line: $\langle 7,$ ________, ________ $\rangle$

$+t\langle 1,$ ________, ________ $\rangle$.

Correct Answers:

- `x - 7 - 2*5*1*(y - 1) - 2*5*-8*(z--8)`
- `1`
- `-8`
- `-10`
- `80`

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6. (1 pt) Find the absolute maximum and absolute minimum of the function $f(x,y) = 2x^3 + y^4$ on the region $\{(x,y) | x^2 + y^2 \leq 36\}$

As usual, ignore unneeded answer blanks, and list points lexicographically.

Absolute minimum value: ________

attained at (____, ____) and (____, ____).

Absolute maximum value: ________

attained at (____, ____), (____, ____) and (____, ____).

Correct Answers:

- `-432`
- `-6`
- `0`
-
-
- `1296`
- `0`
- `-6`
- `0`
- `6`
-
-

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7. (1 pt)

Find the volume of the largest rectangular box in the first octant with three faces in the coordinate planes, and one vertex in the plane $x + 4y + 8z = 32$.

Largest volume is ____________

Correct Answers:

- `37.9259259259259`

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8. (1 pt) Evaluate the double integral $I = \iint_{\mathbf{D}} xy\, dA$ where **D** is the triangular region with vertices $(0,0), (1,0), (0,3)$.

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Correct Answers:

- `0.375`

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9. (1 pt) Evaluate the integral by reversing the order of integration.

$\int_0^1 \int_{7y}^7 e^{x^2}\, dx dy =$ ____________________

Correct Answers:

- `1.36239040892507E+20`

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10. (1 pt) Evaluate the integral by reversing the order of integration.

$\int_0^3 \int_{y^2}^9 y \cos(x^2)\, dx dy =$ ____________________

Correct Answers:

- `-0.157471998568613`

11. (1 pt)
By changing to polar coordinates, evaluate the integral

$\iint_D (x^2+y^2)^{9/2} dxdy$ where D is the disk $x^2+y^2 \le 16$.
The value is ______________.

Correct Answers:

- 2395780.84242223

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12. (1 pt)
Consider the integral $\int_0^5 \int_0^{\sqrt{25-y}} f(x,y)dxdy$. If we change the order of integration we obtain the sum of two integrals:

$$\int_a^b \int_{g_1(x)}^{g_2(x)} f(x,y)dydx + \int_c^d \int_{g_3(x)}^{g_4(x)} f(x,y)dydx$$

$a =$ __________ $b =$ __________

$g_1(x) =$ __________ $g_2(x) =$ __________

$c =$ __________ $d =$ __________

$g_3(x) =$ __________ $g_4(x) =$ __________

Correct Answers:

- 0
- 4.47213595499958
- 0
- 5
- 4.47213595499958
- 5
- 0
- 25-x^2

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13. (1 pt)
Find the first partial derivatives of $f(x,y) = sin(x-y)$ at the point (3, 3).
A. $f_x(3,3) =$ ______________
B. $f_y(3,3) =$ ______________

Correct Answers:

- 1
- -1

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14. (1 pt)
Consider a function $f(x,y)$ at the point $(5,3)$.
At that point the function has directional derivatives:
$\frac{6}{\sqrt{45}}$ in the direction (parallel to) $\langle 6,3 \rangle$, and
$\frac{3}{\sqrt{41}}$ in the direction (parallel to) $\langle 5,4 \rangle$.
The gradient of f at the point $(5,3)$ is
(__________, __________).

Correct Answers:

- 1.66666666666667
- -1.33333333333333

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15. (1 pt) Suppose $f(x,y) = x^2+y^2-6x-4y+2$
(A) How many critical points does f have in $\mathbf{R}^2$?

_____

(B) If there is a local minimum, what is the value of the discriminant D at that point? If there is none, type N.

_____

(C) If there is a local maximum, what is the value of the discriminant D at that point? If there is none, type N.

_____

(D) If there is a saddle point, what is the value of the discriminant D at that point? If there is none, type N.

_____

(E) What is the maximum value of f on $\mathbf{R}^2$? If there is none, type N.

_____

(F) What is the minimum value of f on $\mathbf{R}^2$? If there is none, type N.

_____

Correct Answers:

- 1
- 4
- N
- N
- N
- 2 - 3**2 - 2**2