
1. (1 pt)

Find an equation of the tangent plane to the surface $z = -2x^2 - 1y^2 + 1x + 1y + 1$ at the point $(2, 1, -5)$.

$z =$ _____

2. (1 pt)

Find the linearization of the function $f(x,y) = \sqrt{36 - 4x^2 - 4y^2}$ at the point $(1, 2)$.

$L(x,y) =$ _____

Use the linear approximation to estimate the value of $f(0.9, 2.1) =$ _____

3. (1 pt)

Find the differential of the function $w = x^6 \sin(y^7 z^4)$

$dw =$ _____ $dx +$ _____ $dy +$ _____ dz

4. (1 pt)

Use differentials to estimate the amount of material in a closed cylindrical can that is 50 cm high and 20 cm in diameter if the metal in the top and bottom is 0.1 cm thick, and the metal in the sides is 0.1 cm thick. Note, you are approximating

the volume of metal which makes up the can (i.e. melt the can into a blob and measure its volume), not the volume it encloses.

The differential for the volume is

$dV =$ _____ $dr +$ _____ dh

$dr =$ _____ and $dh =$ _____ (be careful)

The approximate volume of material is _____

5. (1 pt) The dimensions of a closed rectangular box are measured as 80 centimeters, 80 centimeters, and 80 centimeters, respectively, with the error in each measurement at most .2 centimeters. Use differentials to estimate the maximum error in calculating the surface area of the box.

_____ square centimeters

6. (1 pt) Find an equation of the tangent plane to the parametric surface $x = 4r\cos\theta$, $y = -3r\sin\theta$, $z = r$ at the point $(4\sqrt{2}, -3\sqrt{2}, 2)$ when $r = 2$, $\theta = \pi/4$.

$z =$ _____

Note: Your answer should be an expression of x and y ; e.g. " $3x - 4y$ "