

PROBLEM SET 7

MATH 2019 – SPRING 2008

1. Use differentials to estimate the value of $(3.03)^2\sqrt{(2.02)^3 + (1.99)^3}$.
(Hint: Consider $f(x, y, z) = x^2\sqrt{y^3 + z^3}$ and estimate $f(3.03, 2.02, 1.99) - f(3, 2, 2)$.)
2. Given

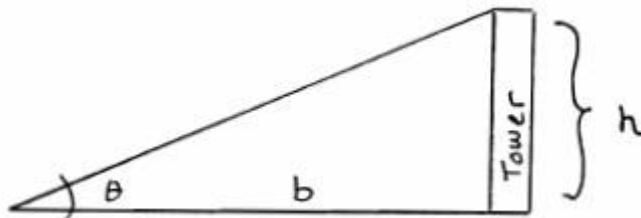
$$w = yz + 3xy^2 + 4z^4$$

$$x = \tan s \sin t$$

$$y = e^{st}$$

$$z = \ln(\sin^2 s + t^4)$$

- (a) Find $\frac{\partial w}{\partial s}$ and $\frac{\partial w}{\partial t}$. Leave your answer in terms of x, y, z, s, t .
 - (b) Find $\frac{\partial w}{\partial t}$ at $s = 0, t = 1$.
3. $yz = \ln(x + z)$ implicitly defines z as a function of x and y . Find the first partial derivatives of z . That is, find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.
 4. I want to determine the height of a tower. I am standing 532 ft from the base of the tower. I measure the angle of elevation to the top of the tower to be 0.52 radians. Using my knowledge of trigonometry, I calculate the height of the tower to be approximately 304.60 ft. Now, the angle of elevation is hard to measure. So I expect there to be a 15% error in this measurement. Since I was a bit careless, there is probably a 1% error in the measurement of my distance from the base of the tower. Use differentials to estimate the error in calculating the height of the tower.



Date: March 2, 2008