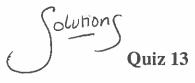
Math 397 Spring 2016 Section 4



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Circle Lecture-time: 9:30 11:00

Show all work. Incomplete answers may receive little or no credit. You need not simplify your answers.

1. (a) Find the linearization of  $f(x,y) = \cos \pi x + xy^2$  at the point (2,1).

$$f(x,y) = coj\pi x + xy^{2}$$

$$f(z,1) = coj^{2\pi} + 2 = 3$$

$$\nabla f = \langle -\pi \sin \pi x + y^{2}, 2xy \rangle$$

$$\nabla f(z,1) = \langle 1, 4 \rangle$$

$$L(x,y) = Z_{0} + f_{x}(x-x_{0}) + f_{y}(y-y_{0})$$

$$L(x,y) = 3 + (x-2) + 4(y-1)$$

(b) Use your answer to part (a) to estimate f(1.9,1.2). You do not need a calculator for this. (Note: My calculator gives f(1.9,1.2) = 3.731)

$$f(1.9,1.2) \approx L(1.9,1.2) = 3 + (1.9-2) + 4(1.2-1)$$
  
= 3 - 0.1 + 4(.2)  
= 3-0.1 + 8  
= 3.7

- 2. Let  $z = x^2y + \cos y 5x$  while  $x = t^3 + s^3$  and  $y = s^2e^t$ .
- (a) Write down the chain rule formula for  $\frac{\partial z}{\partial t}$ .

(b) Use the chain rule to find  $\frac{\partial z}{\partial t}$ . (Give your answer in terms of s and t, but do not simplify at all.)

$$Z_{x} = 2xy-5$$

$$Z_{y} = x^{2}-5iny$$

$$X_{t} = 3t^{2}$$

$$Y_{t} = 5^{2}e^{t}$$

$$\frac{2z}{2t} = (2xy - 5) \frac{3}{3}t^{2} + (x^{2} - Jiny) S^{2}e^{t}$$

$$= (2(t^{3} + s^{3})(s^{2}e^{t}) - 5) \frac{3}{3}t^{2} + ((t^{3} + s^{3})^{2} - Jin(s^{2}e^{t})) s^{2}e^{t}$$