TEST PREP on 14.1 and 14.3 - Dr. Loveless

Test Prep Reminder: Problems come *directly* from the Dr. Loveless old exam archive. Keep asking yourself, could I do this on a test? How would I start? How can I check my work?

14.1, 14.3, 14.4 Extra Help: Here are a few of my review materials on this topic:

- Section 14.1 and 14.3 Lecture Notes - This and the corresponding videos are the best place to go for basic understanding questions relating to 14.1 and 14.3.
- Section 14.3 - a basic definitions sheet on partial derivatives.
- More Patial Deriv. Practice - contains a review of derivatives, including implicit differentiation.
- Please note that 14.1-4 are the introduction to surface analysis tools, the real fun and applications begin in 14.7 when we talk about max/min. That will be in the next test prep.
- The *tangent plane* to $z = f(x, y)$ at (a, b) is given by $z - f(a, b) = f_x(a, b)(x - a) + f_y(a, b)(y - a)$. The main step is finding both partial derivatives. The words *linear approximation* for a surface is another name for a tangent plane.

PARTICIPATION CODE: Don't forget to ask your TA for the participation code! Enter this on Test Prep Quiz for today on Canvas before the end of quiz section!

From Spring 2010, Exam 2, Loveless.

2. Let $z = f(x, y) = x\ln(2x - y) + x\cos(y^2)$

   (a) Find and sketch the domain of the function, $f(x, y)$.

   (b) Find $f_x(x, y)$ and $f_y(x, y)$ at $(x, y) = (\frac{1}{2}, 0)$. (The exam also asks for the tangent plane, can you find it?)

Problem below is from Spring 2017 - Exam 2 - Dr. Loveless (partial derivatives, tangent plane)

2. The total surface area of a solid cone with radius r and height h is given by

$$A(r,h) = \pi r^2 + \pi r\sqrt{r^2+h^2}.$$

Find $A_r(r,h)$ and $A_h(r,h)$ when $r = 3$ inches and $h = 4$ inches. (Could you also find the tangent plane?)

Problem below is from Fall 2013 - Exam 2 - Dr. Loveless (partial derivatives).

2(a) (6 pts) Use implicit differentiation to find $\dfrac{\partial z}{\partial x}$ for $z^3 - 8z - e^2 = x^2\sqrt{y} + \ln(y) - e^{xy^3} - 1$ at the point $(x,y,z) = (2,1,3)$.