Math 208, Section 3

Exam 1

1. (20 pts.) Find the equation of the plane in 3-space which passes though the three points

$$(1,-1,2),\ (1,0,1),\ \text{and}\ (-2,3,5)$$

Does the point (1,2,9) lie on this plane??

2. (20 pts.) Find the partial derivatives of the following functions:

(a) $f(x, y, z) = x^2y^7 - 3yz^3 + \cos(x - y)$

(b) $g(x, y) = \dfrac{xy - 3y + 2}{(x + y)^2 - y^3}$

3. (20 pts.) Find the equation of the tangent plane to the graph of the function

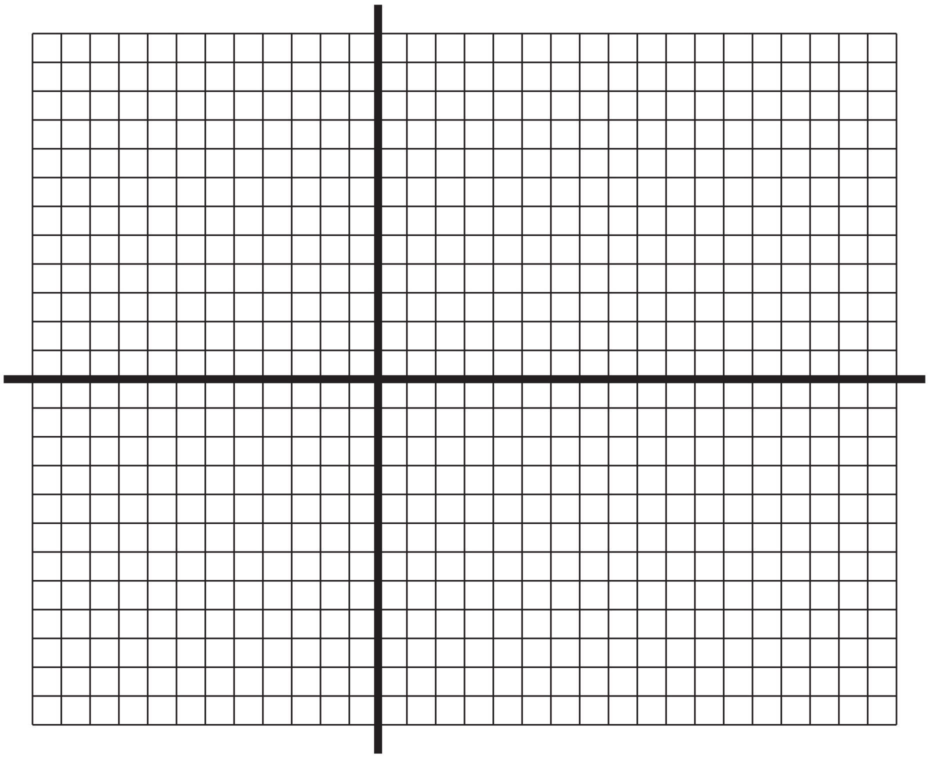
$$z = g(u, v) = 3u^2 - uv^2 + v^5$$

at the point $(2, 1, 11)$.

4. (20 pts.) Sketch the level curves of the function

$$z = f(x, y) = xy - 2x$$

for z-values 0, 1, 2, and -1 . (Hint: solve for y ....) Be sure to label everything appropriately.



5. Find the derivatives of the function

$$f(x, y, z) = x^2 z - xy^3 + 2yz^2$$

at the point (1,0,−1), in the directions of the vectors

$$\vec{v} = (1, 1, 2) \qquad \text{and} \qquad \vec{w} = (2, -1, 1)$$

In what direction is the function f **decreasing** the fastest, at the point (1,0,−1) ??