

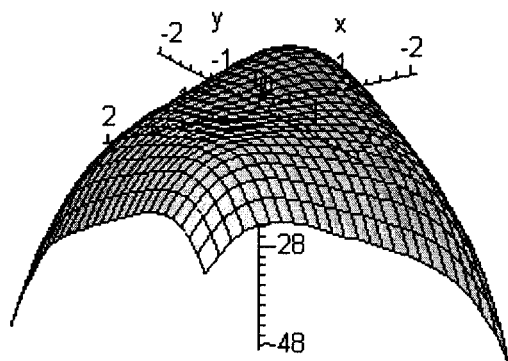
SOLUTIONS

SM223

Quiz 3

10 October 2008

Consider the function shown below, with equation $z = f(x, y) = 4xy - x^4 - y^4$



Find:

1. $f_x = 4y - 4x^3$

2. $f_y = 4x - 4y^3$

3. $f_{xx} = -12x^2$

4. $f_{yy} = -12y^2$

5. $f_{xy} = 4$

6. $f_{yx} = 4$

7. The equation of the tangent plane to the curve at $(1, 0, -1)$. $f_x = -4 @ (1, 0, -1)$
 $f_y = 4 @ (1, 0, -1)$
 $z + 1 = -4(x - 1) + 4(y - 0)$

8. The direction of the tangent plane in problem 7.

$$\langle -4, 4, -1 \rangle \propto \langle 4, -4, 1 \rangle$$

9. The approximate value of z if $x = 0.9$ and $y = 0.1$. (use the information in problem 7 above.)

$$z = -1 - 4(0.9 - 1) + 4(0.1 - 0) = -1 + 4 + 4 = -1 + 8 = 7$$

10. The equation of the tangent plane to the curve at $(1, 1, 2)$. $f_x = 0 @ (1, 1, 2)$
 $f_y = 0 @ (1, 1, 2)$

$$z - 2 = 0(x - 1) + 0(y - 1)$$

$$\text{or } z = 2$$