Subject: Practice Exam

Year. Month. Date. ( )

Problem 1

a) $\langle 3, y-4x^3, x\rangle\Big|_P = \langle -3, 1\rangle$

b) $\Delta W = y - 4x^3\,\Delta x + x\,\Delta y$

Problem 2

a) $\frac{\Delta h}{\Delta s} = \frac{100}{500} = .2$

b) $\frac{\Delta h}{\Delta y} = \frac{-100}{333} \approx -.33$

Problem 3

$\nabla f = (3x^2y, x^3, 2z) = \langle 3, -1, 4\rangle$

$\Rightarrow 3x - y + 4z = 4$

Problem 4

a) $f = xyz$

by sub $\Rightarrow f = xy(1-x^2-y^2)$ d)

c) $A(-B^2) > 0$ b) $= xy - x^3y - xy^3$ $\underbrace{0}$ $\underbrace{1/8}$

$A < 0$ max $f_x = y - 3x^2y - y^3$ $\}$ $(0,0), (\frac{1}{2}, \frac{1}{2})$

$f_y = x - x^3 - 3y^2x$ $\}$

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Problem 5

a) $\nabla f = \langle yz, xz, xy \rangle$

b) $\nabla g = \langle 2x, 2y, 1 \rangle$

$$\left.\begin{aligned} yz &= \lambda 2x \\ xz &= \lambda 2y \\ xy &= \lambda \\ x^2+y^2+z &= 1 \end{aligned}\right\} x=\frac{1}{2},\ y=\frac{1}{2},\ z=\frac{1}{2}$$

Problem 6

$$\left(\frac{\partial w}{\partial x}\right) = f_u \cdot y + f_v \frac{1}{y}$$

$$\left(\frac{\partial w}{\partial y}\right) = f_u \cdot x + f_v \cdot -\frac{x}{y^2}$$

Problem 7

$$\left(\frac{\partial w}{\partial z}\right)_y = 3x^2y\left(\frac{\partial x}{\partial z}\right)_y = \frac{-6x^3yz}{2xy+2z^2} = \frac{-6x^2z}{\;} = -2$$

$$2xy\left(\frac{\partial x}{\partial z}\right)_y + 2zx = 0$$

$$\Rightarrow \left(\frac{\partial x}{\partial z}\right)_y = \frac{-2zx}{2xy+z^2}$$

PAPCO