8.1

#6. $f(x,y) = xye^{x^2+y^2}$

Compute $f(0,0) = 0$

$f(0,1) = 0$

$f(1,1) = e^2$

$f(-1,-1) = e^2$

#16. $f(x,y) = e^{-xy}$

D: ~~x,y~~ all real values of x & y

#20. $f(x,y) = -x^2 + y \qquad z = -2, -1, 0, 1, 2$

$-2 = -x^2 + y$

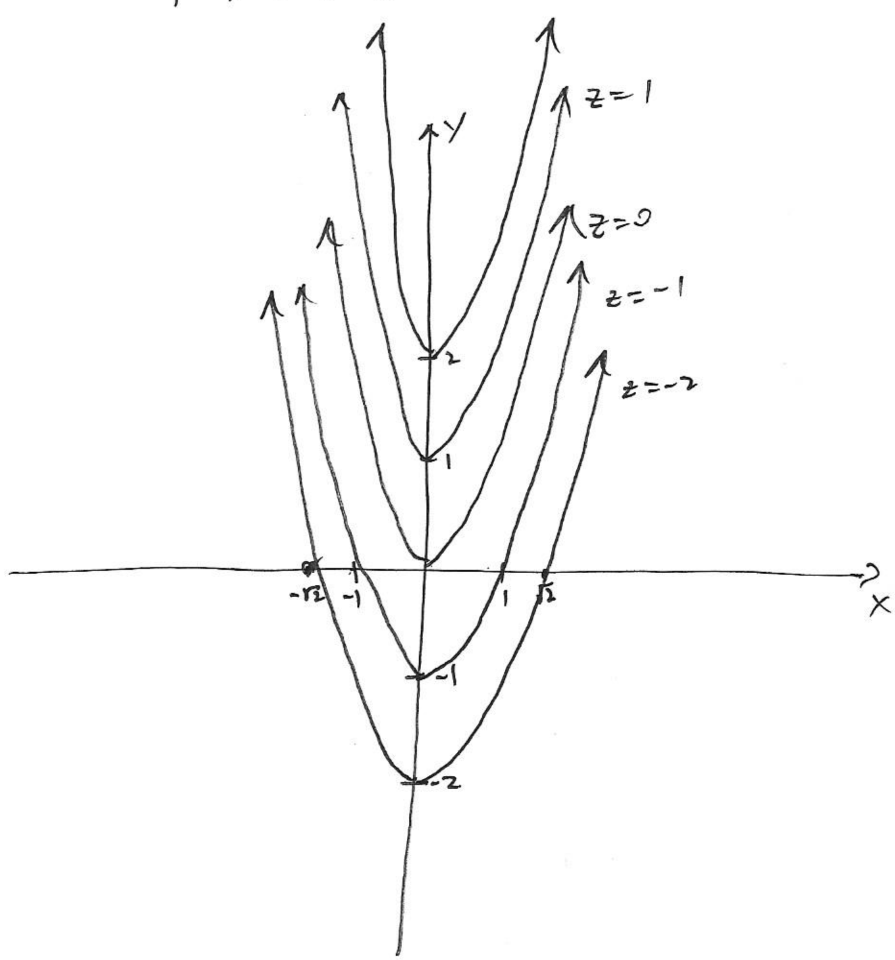
$z = -2 \quad y = x^2 - 2$

$z = -1 \quad y = x^2 - 1$

$z = 0 \quad y = x^2$

$z = 1 \quad y = x^2 + 1$

$z = 2 \quad y = x^2 + 2$



8.1

#36. $R = f(l, r) = \dfrac{kl}{r^4}$

$r = \frac{1}{10}$ cm

$l = 4$ cm

$R = f(4, \frac{1}{10})$

$= \dfrac{4k}{\frac{1}{10}}$

$= 40k$

8.2

#10. $f(x,y) = \dfrac{x^2-y^2}{x^2+y^2}$

$$f_x(x,y) = \frac{(2x)(x^2+y^2) - (x^2-y^2)(2x)}{(x^2+y^2)^2}$$

$$= \frac{2x(x^2+y^2-x^2+y^2)}{(x^2+y^2)^2}$$

$$= \frac{2x(2y^2)}{(x^2+y^2)^2}$$

$$= \frac{4xy^2}{(x^2+y^2)^2}$$

$$f_y(x,y) = \frac{-2y(x^2+y^2) - (x^2-y^2)(2y)}{(x^2+y^2)^2}$$

$$= \frac{-2y(x^2+y^2+x^2-y^2)}{(x^2+y^2)^2}$$

$$= \frac{-2y(2x^2)}{(x^2+y^2)^2}$$

$$= \frac{-4x^2y}{(x^2+y^2)^2}$$

8.2

#38. $f(x,y) = \frac{x+y}{x-y}$ @ $(1,-2)$

$$f_x(x,y) = \frac{(x-y) - (x+y)}{(x-y)^2}$$

$$= \frac{-2y}{(x-y)^2}$$

$$f_x(1,-2) = \frac{4}{9}$$

$$f_y(x,y) = \frac{(x-y) - (x+y)(-1)}{(x-y)^2}$$

$$= \frac{2x}{(x-y)^2}$$

$$f_y(1,-2) = \frac{2}{9}$$

8.2 #42. $f(x,y) = \ln(1+x^2y^2)$

$$f_x(x,y) = \frac{1}{1+x^2y^2}(2xy^2)$$

$$= \frac{2xy^2}{1+x^2y^2}$$

$$f_{xx}(x,y) = \frac{2y^2(1+x^2y^2) - 2xy^2(2xy^2)}{(1+x^2y^2)^2}$$

$$= \frac{2y^2(1+x^2y^2 - 2x^2y^2)}{(1+x^2y^2)^2}$$

$$= \frac{2y^2(1-x^2y^2)}{(1+x^2y^2)^2}$$

$$f_y(x,y) = \frac{1}{1+x^2y^2}(2x^2y)$$

$$= \frac{2x^2y}{1+x^2y^2}$$

$$f_{yy}(x,y) = \frac{2x^2(1+x^2y^2) - 2x^2y(2x^2y)}{(1+x^2y^2)^2}$$

$$= \frac{2x^2(1+x^2y^2 - 2x^2y^2)}{(1+x^2y^2)^2}$$

$$= \frac{2x^2(1-x^2y^2)}{(1+x^2y^2)^2}$$

8.2 #42 cont.

$$f_{xy}(x,y) = \frac{4xy(1+x^2y^2) - 2xy^2(2x^2y)}{(1+x^2y^2)^2}$$

$$= \frac{4xy(1+x^2y^2 - x^2y^2)}{(1+x^2y^2)^2}$$

$$= \frac{4xy}{(1+x^2y^2)^2} \checkmark$$

$$f_{yx}(x,y) = \frac{4xy(1+x^2y^2) - 2x^2y(2xy^2)}{(1+x^2y^2)^2}$$

$$= \frac{4xy(1+x^2y^2 - x^2y^2)}{(1+x^2y^2)^2}$$

$$= \frac{4xy}{(1+x^2y^2)^2} \checkmark$$

$$\therefore f_{xy}(x,y) = f_{yx}(x,y) \checkmark$$

8.2
#48.

$$R(x,y) = -\frac{1}{5}x^2 - \frac{1}{4}y^2 - \frac{1}{10}xy + 200x + 160y$$

$$\frac{\partial R}{\partial x}(x,y) = -\frac{2}{5}x - \frac{1}{10}y + 200$$

$$\frac{\partial R}{\partial x}(300,250) = -\frac{2}{5}(300) - \frac{1}{10}(250) + 200$$

$$= -120 - 25 + 200$$

$$= -145 + 200$$

$$= 55$$

$$\frac{\partial R}{\partial y}(x,y) = -\frac{1}{2}y - \frac{1}{10}x + 160$$

$$\frac{\partial R}{\partial y}(300,250) = -\frac{1}{2}(250) - \frac{1}{10}(300) + 160$$

$$= -125 - 30 + 160$$

$$= -155 + 160$$

$$= 5$$

$\frac{\partial R}{\partial x} = 55$ @ $(300, 250)$ means that rate of finished is 55 units

$\frac{\partial R}{\partial y} = 5$ @ $(300, 250)$ means that rate of unfinished is 5 units