MAT226 Solutions to HW5

$$f(x,y,z) = \sqrt{x^2-y^2} + yz\sin(x^2z)$$

$$\frac{\partial f}{\partial x} = \frac{1}{2\sqrt{x^2-y^2}}\cdot 2x + yz\cos(x^2z)\cdot 2xz = \frac{x}{\sqrt{x^2-y^2}} + 2xyz^2\cos(x^2z)$$ a)

$$\frac{\partial f}{\partial y} = \frac{-2y}{2\sqrt{x^2-y^2}} + z\sin(x^2z) = -\frac{y}{\sqrt{x^2-y^2}} + z\sin(x^2z)$$ b)

$$\frac{\partial f}{\partial z} = y\sin(x^2z) + yz\cos(x^2z)x^2$$ c)

$$\frac{\partial^2 f}{\partial x\partial z} = y\cos(x^2z)\cdot 2xz - yz\sin(x^2z)2xzx^2 + yz\cos(x^2z)\cdot 2x$$

$$= 4xyz\cos(x^2z) - 2x^3yz^2\sin(x^2z)$$ d)

Also equal to $\frac{\partial}{\partial z}\left(\frac{\partial f}{\partial x}\right) = \dots$

$$\frac{\partial^2 f}{\partial y\partial z} = \sin(x^2z) + x^2z\cos(x^2z)$$ e)

Also equal to

$$\frac{\partial}{\partial z}\left(\frac{\partial f}{\partial y}\right) = \sin(x^2z) + z\cos(x^2z)\,x^2$$

$$= \sin(x^2z) + x^2z\cos(x^2z)$$