Ma 2b

Recitation 2:30 3:30. TA Xi

1. Find z_x if $yz = \log(x+z)$

Solution: $y\frac{\partial z}{\partial x} = \frac{1}{x+z}\left(1+\frac{\partial z}{\partial x}\right)$

$$\left(y-\frac{1}{x+z}\right)\frac{\partial z}{\partial x} = \frac{1}{x+z}$$

$$\frac{\partial z}{\partial x} = \frac{1}{x+z}\cdot\frac{x+z}{(x+z)y-1}$$

$$\frac{\partial z}{\partial x} = \frac{1}{(x+z)y-1}$$

2. Use implicit differentiation to find

a) $\frac{\partial z}{\partial x}$ b) $\frac{\partial z}{\partial y}$ about $xyz = x+2y+3z$

Solution a) $\frac{\partial}{\partial x}(xyz) = \frac{\partial}{\partial x}(x+2y+3z)$

$$yz + xy\frac{\partial z}{\partial x} = 1+3\frac{\partial z}{\partial x}$$

$$(xy-3)\frac{\partial z}{\partial x} = 1-yz$$

$$\frac{\partial z}{\partial x} = \frac{1-yz}{xy-3}$$

b) $\frac{\partial}{\partial y}(xyz) = \frac{\partial}{\partial y}(x+2y+3z)$

$$xz + xy\frac{\partial z}{\partial y} = 2+3\frac{\partial z}{\partial y}$$

$$(xy-3)\frac{\partial z}{\partial y} = 2-xz \Rightarrow \frac{\partial z}{\partial y} = \frac{2-xz}{xy-3}$$