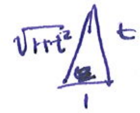
MTH 277, Quiz #18, Spring 2018

Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Apply the chain rule to find $\frac{dw}{dt}$ for $w = xy\cos z, x = t, y = t^2, z = \arctan t$. Be sure your final answer contains only t.



$$\frac{\partial w}{\partial x} = y\cos z = t^2 \cdot \frac{1}{\sqrt{1+t^2}} = \frac{t^2}{\sqrt{1+t^2}}$$

$$\frac{\partial w}{\partial y} = x\cos z = t \cdot \frac{1}{\sqrt{1+t^2}} = \frac{t}{\sqrt{1+t^2}}$$

$$\frac{\partial w}{\partial z} = -xy\sin z = -t \cdot t^2 \cdot \frac{t}{\sqrt{1+t^2}} = \frac{-t^4}{\sqrt{1+t^2}}$$

$$\frac{dx}{dt} = 1$$

$$\frac{dy}{dt} = 2t$$

$$\frac{dz}{dt} = \frac{1}{1+t^2}$$

$$\frac{dw}{dt} = \frac{t^2}{\sqrt{1+t^2}} \cdot (1) + \frac{t}{\sqrt{1+t^2}} \cdot 2t - \frac{t^4}{\sqrt{1+t^2}} \cdot \frac{1}{1+t^2}$$

2. Find the two first implicit partial derivatives for $x\ln y + y^2 z + z^2 = 8$.

$$F = x\ln y + y^2 z + z^2 - 8$$

$\frac{\partial z}{\partial x}$:

$$F_x = \ln y$$

$$F_z = y^2 + 2z$$

$$\frac{\partial z}{\partial x} = \frac{-\ln y}{y^2 + 2z}$$

$\frac{\partial z}{\partial y}$:

$$F_y = \frac{x}{y} + 2yz$$

$$F_z = y^2 + 2z$$

$$\frac{\partial z}{\partial y} = \frac{-\frac{x}{y} + 2yz}{y^2 + 2z}$$