Math 161 Homework 3.9-10

Due: Monday, September 14, 2014

1. Find y' if $y = \tan^{-1}(\sqrt{x})$.

2. A metal disk expands during heating. If its radius increases at the rate of 0.02 inch per second, how fast is the area of one of its faces increasing when its radius is 8.1 inches?

① $y = \tan^{-1}(\sqrt{x})$

$$y' = \frac{1}{1+(\sqrt{x})^2} \cdot (\sqrt{x})' = \frac{1}{1+x} \cdot \left(\frac{1}{2\sqrt{x}}\right)$$

② $r =$ radius of disk

$A =$ area of disk

know $\dfrac{dr}{dt} = 0.02$ in/sec, want to find $\dfrac{dA}{dt}$ when $r = 8.1$ in.

know $A = \pi r^2$. Diff. with respect to t.

$\Rightarrow \dfrac{dA}{dt} = 2\pi r \dfrac{dr}{dt}$ Plug-in $\Rightarrow \dfrac{dA}{dt} = 2\pi (8.1)(0.02)$

$$= 0.324\pi$$

$$\approx 1.01788 \text{ in}^2/\text{sec}$$