Homework 12

7) $\frac{d}{dx}\left(\sqrt{\frac{x-1}{x+1}}\right) \Rightarrow y = \sqrt{\frac{x-1}{x+1}}$

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

$$\ln y = \frac{1}{2}\ln\left(\frac{x-1}{x+1}\right)$$

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

$$\frac{1}{y}\frac{dy}{dx} = \frac{1}{2}\cdot\frac{1}{x-1} - \frac{1}{2}\cdot\frac{1}{x+1}$$

$$\frac{dy}{dx} = y\left[\frac{1}{2(x-1)} - \frac{1}{2(x+1)}\right]$$

$$\frac{dy}{dx} = \sqrt{\frac{x-1}{x+1}}\left[\frac{1}{2(x-1)} - \frac{1}{2(x+1)}\right]$$

8) $\frac{d}{dx}\left(\frac{\sqrt[3]{x-2}}{(1+x^2)^4}\right) \Rightarrow y = \frac{\sqrt[3]{x-2}}{(1+x^2)^4}$

$$\ln y = \ln\left(\frac{\sqrt[3]{x-2}}{(1+x^2)^4}\right)$$

$$\ln y = \ln \sqrt[3]{x-2} - \ln(1+x^2)^4$$

$$\ln y = \frac{1}{3}\ln(x-2) - 4\ln(1+x^2)$$

$$\frac{1}{y}\frac{dy}{dx} = \frac{1}{3}\cdot\frac{1}{x-2} - 4\cdot\frac{1}{1+x^2}\cdot 2x$$

$$\frac{dy}{dx} = y\left[\frac{1}{3(x-2)} - \frac{8x}{1+x^2}\right]$$

$$\frac{dy}{dx} = \frac{\sqrt[3]{x-2}}{(1+x^2)^4}\left[\frac{1}{3(x-2)} - \frac{8x}{1+x^2}\right]$$

10) $7\ln(x^2y^2) = 6$

$7\ln x^2 + 7\ln y^2 = 6$

$14\ln x + 14\ln y = 6$

$\frac{14}{x} + \frac{14}{y} \cdot \frac{dy}{dx} = 0$

$\frac{14}{y}\frac{dy}{dx} = -\frac{14}{x}$

$\frac{dy}{dx} = -\frac{14}{x} \cdot \frac{y}{14}$

$\frac{dy}{dx} = -\frac{y}{x}$

9) $f(x) = 8\ln x \quad @ \; x = 1$

$f(1) = 8\ln 1 = 0$

$f'(x) = \frac{8}{x}$

$f'(1) = \frac{8}{1} = 8$

$y = 8(x-1)$

Homework 11

(4) $\cos(x^2y^2) = 3x + y$

$$-\sin(x^2y^2)\left(x^2 \cdot 2y\frac{dy}{dx} + y^2 \cdot 2x\right) = 3 + \frac{dy}{dx}$$

$$-2x^2y\sin(x^2y^2)\frac{dy}{dx} - 2xy^2\sin(x^2y^2) = 3 + \frac{dy}{dx}$$

$$\frac{dy}{dx} + 2x^2y\sin(x^2y^2)\frac{dy}{dx} = -3 - 2xy^2\sin(x^2y^2)$$

$$\frac{dy}{dx}\left(1 + 2x^2y\sin(x^2y^2)\right) = -3 - 2xy^2\sin(x^2y^2)$$

$$\frac{dy}{dx} = \frac{-3 - 2xy^2\sin(x^2y^2)}{1 + 2x^2y\sin(x^2y^2)}$$