Math 132 Quiz 3 Date 03/12/2011

**Ex1:** Find $\frac{dy}{dx}$ for $y=\sqrt{\frac{x-2}{x+3}}$

**Solution:**

$$y=\left(\frac{x-2}{x+3}\right)^{\frac{1}{2}}, \text{ So } \frac{dy}{dx}=\frac{1}{2}\cdot\frac{d}{dx}\left(\frac{x-2}{x+3}\right)\cdot\left(\frac{x-2}{x+3}\right)^{\frac{1}{2}-1}$$

**Thus:**

$$\frac{dy}{dx}=\frac{1}{2}\ \frac{x+3-x+2}{(x+3)^2}\left(\frac{x-2}{x+3}\right)^{-\frac{1}{2}}=\frac{5}{2(x+3)^2}\left(\frac{x+3}{x-2}\right)^{\frac{1}{2}}$$

$$=\frac{5}{2(x+3)^{3/2}(x-2)^{1/2}}$$

**Ex2:** If $z=2y^2-4y+5$, $y=6x-5$ and $x=2t$, use the Chain rule to find $\left.\frac{dz}{dt}\right|_{t=1}$.

**Solution:** By the chain rule we have that:

$$\frac{dz}{dt}=\frac{dz}{dy}\,\frac{dy}{dx}\,\frac{dx}{dt}=(4y-4).6.2=48(y-1)$$

Now, when $t=1$, $x=2$. Therefore $y=12-5=7$.

Hence $\left.\frac{dz}{dt}\right|_{t=1}=48(7-1)=288$

**Ex3:** Find an equation of the tangent line to $y=\frac{-3}{(3x^2+1)^3}$ at $x=0$.

**Solution:** $y=-3(3x^2+1)^{-3}$

$$\frac{dy}{dx}=-3\left[-3(6x)(3x^2+1)^{-4}\right]=\frac{54x}{(3x^2+1)^4}.$$ The slope is given by $\left.\frac{dy}{dx}\right|_{x=0}=0$. Now $y(0)=-3$. Hence an equation of the tangent line is: $y=-3$.