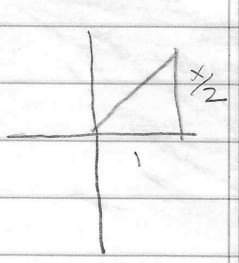
10. $y = \arctan\left(\frac{x}{2}\right)$




$\tan y = \frac{x}{2}$

$\sec^2 y \frac{dy}{dx} = \frac{1}{2}$

$\frac{dy}{dx} = \frac{1}{2\sec^2 y}$

$1^2 + \frac{x^2}{4} = r^2$

$\frac{4+x^2}{4} = r^2$

$\frac{\sqrt{4+x^2}}{2} = r$

$\frac{dy}{dx} = \frac{1}{2\left(\frac{\sqrt{4+x^2}}{2}\right)^2}$

$\frac{dy}{dx} = \frac{1}{\frac{4+x^2}{2}}$

E $\quad \frac{dy}{dx} = \frac{2}{4+x^2}$

11. $\lim_{x\to 0} \frac{4x - \sin x}{2x}$

$\lim_{x\to 0} \frac{4x}{2x} - \frac{\sin x}{2x}$

$\lim_{x\to 0} 2 - \frac{1}{2}\left(\frac{\sin x}{x}\right) \to 1$

$\frac{3}{2}$

1. $y = \ln\sqrt{x}$

$y' = \frac{1}{\sqrt{x}} \cdot \frac{1}{2}x^{-1/2}$

$y' = \frac{1}{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}}$

$y' = \frac{1}{2x}$

2. $y = \ln(1+e^x)$

$y' = \frac{1}{1+e^x} \cdot e^x$

$y' = \frac{e^x}{1+e^x}$

3. $y = xe^{-x}$

$y' = x \cdot (e^{-x} \cdot -1) + e^{-x} \cdot 1$

$y' = \frac{-x}{e^x} + \frac{1}{e^x}$

$y' = \frac{-x+1}{e^x}$

4. $y = e^{1+\ln x}$

$y' = e^{1+\ln x} \cdot \frac{1}{x}$

$y' = \frac{e^{1+\ln x}}{x}$