

Calc 1 Worksheet 3: The chain rule

Rules for Derivatives		
$(x^n)' = nx^{n-1}$ for any real n	$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$	$(\sin x)' = \cos x$ $(\cos x)' = -\sin x$
$(b^x)' = (\ln b)b^x$ for any $b > 0$	$(e^x)' = e^x$	$(\ln x)' = \frac{1}{x}$
$(cf)' = cf'$ for constant c $(f \pm g)' = f' \pm g'$	$[f(g(x))]' = f'(g(x))g'(x)$	$(fg)' = f'g + g'f$ $\left(\frac{f}{g}\right)' = \frac{f'g - g'f}{g^2}$

Use the chain rule to find the derivatives of the following functions:

1. $f(x) = e^{3x}$

2. $f(x) = \sqrt{4x^3 + 6x}$

3. $f(x) = \ln(\cos x)$

4. $f(x) = \sin\left(\frac{1}{x^2 + 1}\right)$