

Name: Key

NO CALCULATORS

1. [5 points each] Compute each of the following derivatives.

a. $(\sec \ln x^2)'$

$$= \sec(\ln x^2) \tan(\ln x^2) \cdot (\ln x^2)'$$

$$= \frac{2 \sec(\ln x^2) \tan(\ln x^2)}{x} \quad \text{since } \frac{2x}{x^2} = \frac{2}{x}$$

b. $(\cosh 5x^6)' = \sinh(5x^6) \cdot (5x^6)'$

$$= 30x^5 \sinh(5x^6)$$

c. $((\tan x^3) \cdot e^{x^2})' =$

$$(\tan x^3)' e^{x^2} + (\tan x^3) (e^{x^2})' =$$

$$\sec^2(x^3) \cdot (x^3)' e^{x^2} + \tan(x^3) \cdot e^{x^2} (x^2)' =$$

$$3x^2 \sec^2(x^3) e^{x^2} + 2x \tan(x^3) e^{x^2}$$

d. $(\tan^{-1} t^5)' = \frac{(t^5)'}{1 + (t^5)^2}$

$$= \frac{5t^4}{1 + t^{10}}$$

e. $(\sin^{-1} 4^x)' = \frac{(4^x)'}{\sqrt{1 - (4^x)^2}}$

$$= \frac{4^x \ln 4}{\sqrt{1 - 4^{2x}}}$$

f. Let $y = x^x$. Find $\frac{dy}{dx}$.

$$\ln y = \ln x^x$$

$$\ln y = x \ln x$$

$$\frac{y'}{y} = \ln x + \frac{x}{x}$$

$$y' = y(\ln x + 1)$$

$$y' = x^x(1 + \ln x)$$