Basic Derivative Rules
2.5 – Differentiating $e^{f(x)}$ and $\ln f(x)$

Derivative of $\boldsymbol{ln}\ [\boldsymbol{f(x)}]$

$$\frac{d}{dx}[\ln(f)] = \frac{\frac{d}{dx}(f)}{f}$$

Ex A: Find the derivative of each function.

#1) $f(x) = \ln(x^2 - x + 6)$

#2) $f(x) = \ln(x^4 + 9x^2 - 8)$

#3) $f(x) = \ln(x^2 - 1)^5$

#4) $f(x) = x^2 \ln(x)$

#5) $f(x) = \frac{\ln(x)}{x}$

Derivative of $\boldsymbol{e^{f(x)}}$

$$\frac{d}{dx}(e^f) = \frac{d}{dx}(f) \cdot e^f$$

Ex B: Find each derivative.

#1) $\frac{d}{dx} e^{x^2+x-1}$

#2) $\frac{d}{dx} e^{\frac{x^2}{2}}$

#3) $\left(e^{\frac{1}{4}x^4-1}\right)'$

#4) $\left(\frac{e^x}{x}\right)'$

#5) If $f(x) = xe^x$, find $f'(1)$

#6) If $f(x) = e^x \ln(x)$, find $f'(1)$

#7) $[\ln(x^2 + e^x)]'$

POLE VAULTING

#1) After t weeks of practice a pole vaulter can vault $H(t) = 14(1 - e^{-0.10t})$ feet. Find the rate of change of the athlete's jumps after

a. 0 weeks (at the beginning of training)

b. 12 weeks of training