NAME: KEY Period: ____

v. 3

SHEET #322:

DERIVATIVES OF POLYNOMIALS AND EXPONENTIALS.

Given these rules:

→ $\frac{d}{dx}(b) = 0$ $\frac{d}{dx}(mx+b) = m$

$\frac{d}{dx}(x^n) = n \cdot x^{n-1}$

→ $\frac{d}{dx}(e^x) = e^x$ $\frac{d}{dx}(a^x) = (\ln a) \cdot a^x$.

A. FILL OUT

x	0	1	e	e^2	$2x$	$x+2$
$\ln(x)$	$-\infty$	0	1	2	$\ln(2)+\ln(x)$.	$\ln(x+2)$

B. Find:

1. $\frac{d}{dx}(4x^3) = \boxed{12x^2}$
2. $\frac{d}{dx}(3x^5 + 4x - 5) = \boxed{15x^4 + 4}$
3. $\frac{d}{dx}\left(\frac{1}{x^4}\right) = \frac{d}{dx}(x^{-4}) = -4x^{-5} = \boxed{\frac{-4}{x^5}}$
4. $\frac{d}{dx}(4e^x) = \boxed{4e^x}$
5. $\frac{d}{dx}(3^x) = \boxed{\ln(3) \cdot 3^x}$
6. $\frac{d}{dx}(\sqrt{x}) = \frac{d}{dx}(x^{1/2}) = \frac{1}{2}x^{-1/2} = \boxed{\frac{1}{2\sqrt{x}}}$
7. $\frac{d}{dx}(4^x + x^4) = \boxed{\ln(4) \cdot 4^x + 4x^3}$

EXTRA:

8. $\frac{d}{dx}(e^{x+1}) = \frac{d}{dx}(e^x \cdot e^1) = \frac{d}{dx}(e^x) \cdot e = e^x \cdot e = \boxed{e^{x+1}}$
9. $\frac{d}{dx}(e^{2x}) = \frac{d}{dx}\left((e^2)^x\right) = \ln(e^2) \cdot (e^2)^x = 2(e^2)^x = \boxed{2e^{2x}}$.