Derivatives and Exponents of Exponential Functions

$$\frac{d}{dx}a^x = a^x dx \ln a \quad so, \int a^x dx = \frac{a^x}{\ln a} + C$$

$$\frac{d}{dx}e^x = e^x dx \quad so, \int e^x dx = e^x + C$$

Derivatives of Exponential Functions: *Find the derivative of the following.*

1) $y = e^{x - e^{2x}}$

2) $y = \pi^{\cos x}$

3) $y = e^{\ln x^2}$

4) $y = \sqrt{4 + e^{2x}}$

Indefinite Integrals of Exponential Functions: *Integrate the following.*

5) $\int x^3 e^{-3x^4} dx$

6) $\int x^2 5^{-x^3} dx$

Definite Integrals of Exponential Functions: *Find the following.*

7) $\int_0^{\ln 5} e^x \left(3 - 4e^x \right) dx$

Tangent Lines: *Find the equation of the tangent line at the given value.*

8) $y = 2^x \quad$ at $x = 3$

Tangent Lines: *Find where the function has a horizontal tangent.*

9) $y = xe^x$