

Worksheet for e^x and $\ln x$

Professor Danielle Benedetto -Math 11

1. Simplify each of the following

(a) $\ln(e^{\ln e})$

(b) $\ln \left| \ln \frac{1}{e} \right|$

2. Solve each of the the following equations for x :

(a) $\ln(\ln x) = 1$

(b) $\ln(x^2) = 2 + \ln x$

(c) $e^{3x-4} = 7$

3. Decide whether each statement is True or False. Explain why or why not.

(a) $(e^x)^2 = e^{x^2}$

(b) $\ln 5 - \ln 3 = \ln 2$

(c) $(\ln x)(\ln x) = \ln(x^2)$

4. Let $x^2 e^y = \ln(xy)$. Find $\frac{dy}{dx}$.

5. Find the area enclosed by $y = e^x$, $y = e^{3x}$ and $x = 1$.

6. Find all maximum or minimum values for $g(x) = \ln(1 + x^2)$.

7. Compute the derivatives of the following functions. (Hint: You may want to simplify first.)

(a) $f(x) = \ln(5xe^{-5x})$

(b) $f(x) = e^{(\ln(x^2 + x) - \ln x)}$

(c) $f(x) = \ln \left(\frac{xe^x}{\sqrt{e^{7x}}} \right)$

8. Compute the following Integrals:

$$(a) \int \frac{we^{w^2}}{(17 + e^{w^2})^3} dw$$

$$(b) \int \frac{e^{-x} \ln(1 + e^{-x})}{1 + e^{-x}} dx$$

$$(c) \int_e^{e^4} \frac{1}{x\sqrt{\ln x}} dx$$

$$(d) \int (e^{3x} + e^{-7x})^2 dx$$

$$(e) \int \frac{1}{2x - 1} dx$$

9. Let $f(x) = x^4 e^{-x}$. For this function, discuss domain, vertical and horizontal asymptote(s), interval(s) of increase or decrease, local extreme value(s), concavity, and inflection point(s). Then use this information to present a detailed and labelled sketch of the curve.

Take my word that $\lim_{x \rightarrow \infty} f(x) = 0$ and $\lim_{x \rightarrow -\infty} f(x) = +\infty$