

Homework 1 – Introduction and Review

For problems 1-14, fill in the blanks.

1) $\lim_{x \rightarrow 0} e^x = \underline{\hspace{2cm}}$

2) $\lim_{x \rightarrow \infty} 3^x = \underline{\hspace{2cm}}$

3) $\lim_{x \rightarrow \infty} 3^{-x} = \underline{\hspace{2cm}}$

4) $\lim_{x \rightarrow -\infty} 3^x = \underline{\hspace{2cm}}$

5) $\lim_{x \rightarrow 0^+} \ln x = \underline{\hspace{2cm}}$

6) $\lim_{x \rightarrow \infty} \ln x = \underline{\hspace{2cm}}$

7) $\lim_{x \rightarrow -\infty} \ln|x| = \underline{\hspace{2cm}}$

8) $\int_0^4 2^t dt = \underline{\hspace{2cm}}$

9) $\int e^{4x+2} dx = \underline{\hspace{2cm}}$

10) $\int \sinh(5x) dx = \underline{\hspace{2cm}}$

11) $\int_0^1 \cosh x dx = \underline{\hspace{2cm}}$

12) $\int \sinh^2 x dx = \underline{\hspace{2cm}}$

13) $y = \ln(5x); \quad y' = \underline{\hspace{2cm}}$

14) $y = 5 \cdot 4^x; \quad y' = \underline{\hspace{2cm}}$

15) Graph the following functions on the same set of axes:

$$y = e^x$$

$$y = 2^x$$

$$y = 4^x$$

$$y = 2^{-x}$$

16) Graph the following functions on the same set of axes:

$$y = \sinh x$$

$$y = \cosh x$$

17) If $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = \infty$, we say that $f(x)$ is of higher order than $g(x)$ or $f(x) \gg g(x)$.

Arrange the following expressions in the spaces below: e^x , 2^x , $\ln x$, x^2 , \sqrt{x}

_____ \gg _____ \gg _____ \gg _____ \gg _____

18) True (T) or False (F)?

a) _____ $\ln x \cdot \ln y = \ln(x + y)$

b) _____ $\ln xy = \ln x + \ln y$

c) _____ $\ln\left(\frac{5e^x}{x^2}\right) = 5x - 2\ln x$

d) _____ $e^{x+y} = e^x + e^y$

e) _____ $e^{x-2y} = \frac{e^x}{(e^y)^2}$

f) _____ $\ln\left(\frac{x^2 \sin x}{e^x \tan^3 x}\right) = 2\ln x + \ln(\sin x) - x - 3\ln(\tan x)$

g) _____ $e^{x \sin x} e^{\ln(x^2+2)} = (e^x + e^{\sin x})(x^2 + 2)$

h) _____ $\ln(x^2 + 2) - \ln(2^x) = \frac{\ln(x^2 + 2)}{x \ln 2}$

i) _____ $\sinh(\ln 3) = \frac{4}{3}$

j) _____ $\cosh(2) = \frac{5}{4}$