

Final Review 1 – Computations

1. Find the horizontal asymptotes of the function

$$f(x) = \left(1 + \frac{1}{x}\right)^x.$$

2. Let

$$f(x) = \begin{cases} \frac{1}{x\sqrt{1+x}} - \frac{1}{x} & \text{if } x < 0 \\ 1 & \text{if } x \geq 0 \end{cases}$$

Is f a continuous function?

3. For what numbers a, b such that the curve $y^2 + axy = b \ln x$ passes through $(1, -2)$ and the tangent line at $(1, -2)$ has slope -4 ?

4. True/False Questions:

1. If $f''(2) = 0$, then $(2, f(2))$ is an inflection point of the curve $y = f(x)$.
 2. There exists a function f such that $f(0) = 2$, $f(1) = 0$, and $f'(x) > 0$ for all x .
 3. The graph of a function f has a vertical tangent line at $(a, f(a))$ if and only if $x = a$ is a vertical asymptote of f .
5. Find the derivative of the function $y = \sqrt{x}e^{x^2}(x^2 + 1)^{10}$.