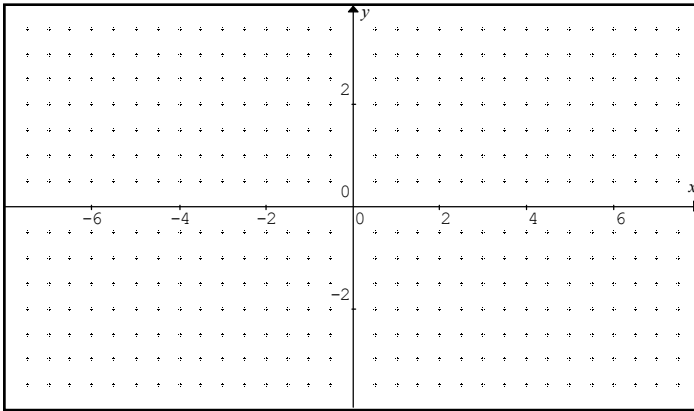


You must show your work. All answers must be exact unless indicated otherwise.

1. Use the given graph of $y = f(x)$ to find the limits. (3 points each)



a. $\lim_{x \rightarrow 2^+} f(x) =$ _____ b. $\lim_{x \rightarrow -1} f(x) =$ _____ c. $\lim_{x \rightarrow 0} f(x) =$ _____

2. Evaluate the limit analytically. (7 points each)

a. $\lim_{x \rightarrow 0} e^{3x} \cos 2x =$ _____ b. $\lim_{x \rightarrow 0} \frac{\sqrt{3+x} - \sqrt{3}}{x} =$ _____

c. $\lim_{\theta \rightarrow 0} \frac{\sec \theta - 1}{\theta \sec \theta} =$ _____

3. Given that $y = f(x)$ is continuous at $x = 5$, what three things do we know must be true about f ? (6 points)

4. Find the derivative of the function. Do not simplify your answers. (6 points each)

a. $f(x) = 3x^4 - \ln(5x - 7)$

b. $f(x) = e^{8x^3} + \arctan(3x^2)$

5. Find the derivative **using the definition**. $f(x) = \frac{1}{x-2}$ (10 points)

6. Find the equation of the tangent line of the function $y = -4e^{2x}$ when $x = 1$. You may leave your answer in point-slope form. (7 points)

7. Find the derivative of the function. Do not simplify your answers. (7 points each)

a. $f(x) = \frac{\sec x}{x^2 - 5x + 3}$

b. $y = x^3 \cot x$

c. $f(x) = \sin(\cos 4x)$

8. Find $\frac{dy}{dx}$. Circle your answers. (7 points each)

a. $x^2 y^2 - 3x + \sin y = 5$

b. $y = x^{x+1}$

BONUS

Find functions f and g such that $\lim_{x \rightarrow c} f(x) = \infty$ and $\lim_{x \rightarrow c} g(x) = \infty$ but $\lim_{x \rightarrow c} [f(x) - g(x)] \neq 0$.