

Test questions on **Limits and Continuity**

No calculator allowed.

- Sketch the graph of a function f with the properties $\lim_{x \rightarrow 3} f(x) = 4$ and $f(3) = 2$.
- Sketch the graph of a function g with the properties $\lim_{x \rightarrow -2} g(x) = 3$ but $g(-2)$ does not exist.
- Find $\lim_{x \rightarrow \infty} \frac{x^2}{e^x}$.
- Describe the graph of the function $\frac{x^2}{e^x}$ as $x \rightarrow \infty$?
- Find $\lim_{x \rightarrow -\infty} \frac{x^2}{e^x}$.
- Consider the function $f(x) = \frac{x-3a}{x^2-5ax+6a^2}$.
 - Find $f(3a)$
 - $\lim_{x \rightarrow 3a} f(x)$
- Write an equation of a function with a vertical asymptote at $x = 3$.
- Write an equation of the asymptote(s) of $f(x) = \frac{3x-7}{x+2}$.
- What is the range of the function $g(x) = \frac{8+e^x}{4+2e^x}$? Justify your answer.
- If the minimum value of the function $f(x) = xe^x$ is $-e^{-1}$, what is the range of $f(x)$? Explain your reasoning.
- Describe the similarities and differences of the graphs of $f(x) = \frac{2}{x-3}$ and $g(x) = \frac{2}{(x-3)^2}$.
- Describe the continuity of the function $y = (\text{the slope of } |x|)$. Justify your answer.