

1. Find the following limits. Show your work.

(a)  $\lim_{x \rightarrow 1} \sqrt{x^2 - x + 1}$

(b)  $\lim_{x \rightarrow 0^+} \frac{|x|}{x}$

(c)  $\lim_{x \rightarrow 0} \frac{\sin(x^2)}{x}$

2. Are the following functions continuous? Justify your response.

(a)  $f(x) = x^4 + 2x^2 + 5$  at  $x = 5$

(b)  $f(x) = \frac{1}{1-x}$  on the interval  $[0, 2]$

(c)  $f(x) = \frac{1}{1-x}$  on the interval  $(1, 2]$

(d)  $f(x) = \frac{|2x+3|}{2x+3}$  over  $\mathbb{R}$

3. Find the derivative of  $f(x) = 6x^2 + x - 10$  using the formal definition of the derivative.

4. Find the derivative of the functions. Show your work.

(a)  $f(x) = \frac{1}{x^{2/3}}$

(b)  $f(x) = e^{x^2+1} + x \log(x+3)$

(c)  $f(x) = \frac{x+1}{x^2+2x+5}$

5. Find the maximum and minimum points of  $f(x)$  on the interval  $[-2, -1/4]$ .

$$f(x) = \frac{(x-1)^3}{x}$$

(Hint: The roots of the polynomial  $2x^3 - 3x^2 + 1$  are 1 and  $-1/2$ .)