

Answer the following questions:

Evaluate the following limit (if it exists)

$$\lim_{x \rightarrow 1} \frac{\sqrt[3]{x+7} - 2}{x-1}$$

2. Find the horizontal and vertical asymptotes (if any) for the graph of

$$f(x) = \frac{x^2 - 2x - 3}{|x-1|\sqrt{x^2+1}}$$

Show that the equation

$$2x^3 + x \cos x - 1 = 0$$

has a real solution.

$$\text{Let } f(x) = \begin{cases} (1-x)^{1/2}, & \text{if } x \leq 1, \\ (1-x)^{1/3}, & \text{if } x > 1. \end{cases}$$

Does the graph of f have a cusp? Explain.5. Use the definition of the derivative to find $f'(x)$ where,

$$f(x) = x^3 + \sin x.$$

6. Find the constants A and B so that $f'(2)$ exists, where

$$f(x) = \begin{cases} Bx - 2, & \text{if } x < 2, \\ 3x^2 + A, & \text{if } x \geq 2. \end{cases}$$

7. Find y' , if

$$y = (2x^4 + 1) \cos^2 \sqrt{x} + \sec\left(\frac{x-1}{x+1}\right).$$

(Good Luck)