

1. Name:

ID #:

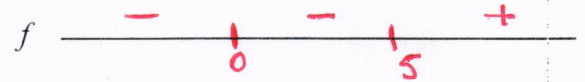
(Show your work)

Q1. Consider the function $y = f(x) = x^{\frac{2}{3}}(x-5)$ Follow the steps to sketch the Graph of the function.

1) Find the domain and symmetry if any

$D = \mathbb{R}$ no symmetry

2) Find y-int. then x-int. then check if the graph above the x-axis or below.

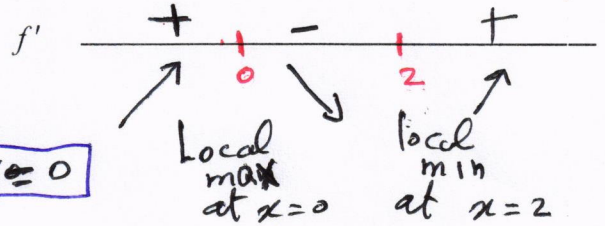


3) Find relative extreme then check if the graph increasing or decreasing (Check for vertical tangent at $x=0$)

$$y' = \frac{2}{3} x^{-\frac{1}{3}}(x-5) + x^{\frac{2}{3}} = x^{-\frac{1}{3}} \left[\frac{2}{3}(x-5) + \frac{3x}{3} \right] = \frac{5x-10}{3\sqrt[3]{x}}$$

$$y' = 0 \Rightarrow x = \frac{10}{5} = 2$$

$$y' \text{ DNE } \quad x = 0$$



Vertical tangent at $x=0$

4) Find asymptotes if any (Check the behavior of the graph as $x \rightarrow \infty$ and $x \rightarrow -\infty$)

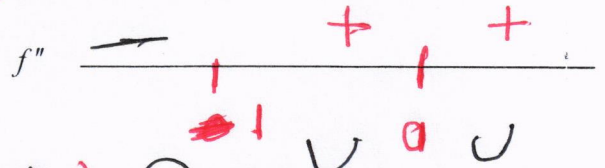
$$\lim_{x \rightarrow -\infty} f(x) = -\infty$$

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

No asymptotes

5) Find inflection points if any then check if the graph concave up or down

$$f'' = \frac{5(3\sqrt[3]{x}) - (5x-10)3\sqrt[3]{x}^{-\frac{2}{3}}}{9\sqrt[3]{x^2}}$$



$$f'' = \frac{5}{3} x^{-\frac{1}{3}} - \frac{(5x-10)}{9} x^{-\frac{5}{3}} = \frac{10(x+1)}{9\sqrt[3]{x^4}}$$

6) Sketch f

