

Shape of Curves Quiz

Name: _____

Key

Date: February 18, 2020

Thinking Strategies	Communication	Modelling & Solving

1. Determine the slant or horizontal asymptote of the following functions.

(a) $f(x) = \frac{-3x^3 - 2x^2 + 5x - 7}{6x^3 - 10x^2 + 5x - 20}$

$$\lim_{x \rightarrow \infty} f(x) = \lim_{x \rightarrow \infty} \frac{-3x^3}{6x^3} = -\frac{1}{2} = \text{H.A.}$$

(b) $g(x) = \frac{5x^4 - 18x^3 + 2x - 10}{x^3 - 2x^2 + 3x - 4}$

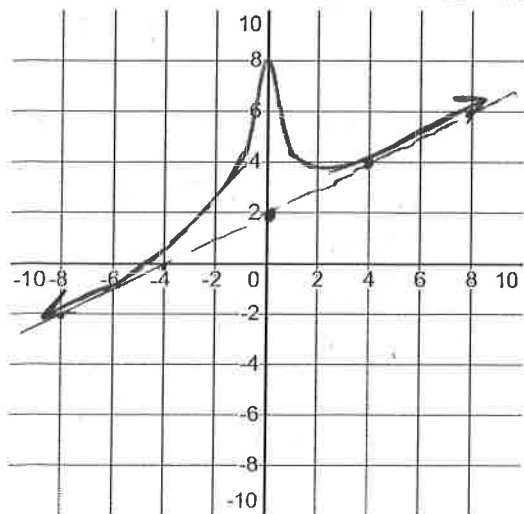
$$\lim_{x \rightarrow \infty} g(x) = \lim_{x \rightarrow \infty} \frac{5x^4 - 18x^3}{x^3 - 2x^2}$$

$$\begin{array}{r} 5x - 8 \\ x^3 - 2x^2 \overline{) 5x^4 - 18x^3} \\ \underline{-(5x^4 - 10x^3)} \\ -8x^3 \end{array}$$

Slant asy. $y = 5x - 8$

2. Graph the rest of the function $y = \frac{x^3 + 4x^2 + 8}{2x^2 + 1}$

$$\begin{aligned} \text{as } x \rightarrow \infty \quad y &\rightarrow \frac{x^3 + 4x^2}{2x^2} \\ &= \frac{1}{2}x + 2 \end{aligned}$$



3. Determine the inflection points and the intervals when the function below is concave up.

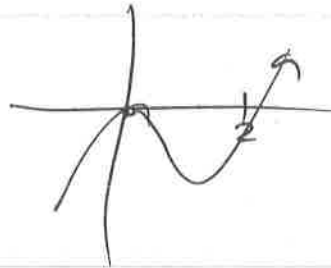
$$h(x) = \frac{3}{5}x^5 - 2x^4 + x - 1$$

$$h'(x) = 3x^4 - 8x^3 + 1$$

$$h''(x) = 12x^3 - 24x^2$$

$$= 12x^2(x-2) = 0$$

$$x=0 \text{ or } 2$$

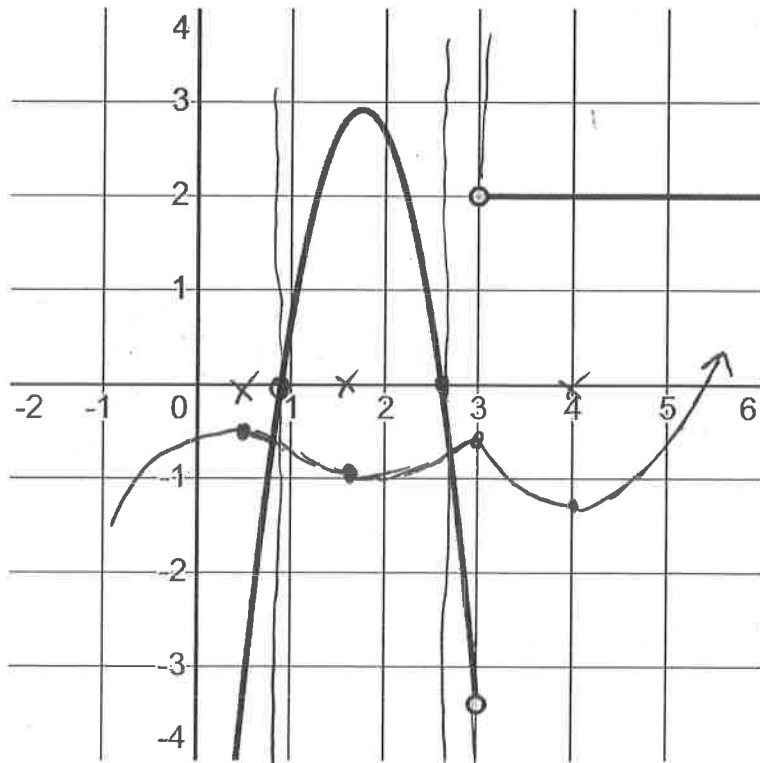


inflection point

@ $x=2$ (\cap to \cup)

concave up when $x > 2$

4. Given the graph of $k''(x)$ and the fact that $k'(x) = 0$ when $x = \frac{1}{2}, \frac{3}{2}$, and 4 AND $k'(3)$ is undefined. Determine where k has a local extrema and the type given that it is continuous.



local max @
 $x = 0.5$ $k'(0.5) = 0$
 and $k''(0.5) < 0$

local min @
 $x = 1.5$ and 4
 b/c $k'(x) = 0$
 and $k''(x) > 0$

local max @ $x = 3$
 b/c the graph

↑ to U
 no slope has slope 0

