MCV4U - Unit 4Test
Curve Sketching

Name:_____
Date: _____

Mark: _____
45

*Answer all questions on this paper. Be sure to show all **applicable** work and express all answers in simplest form. Marks are awarded for presentation and technical correctness.*

1. State the x-intercept(s) of the function $y = \dfrac{x^2 - 3x}{(x-3)}$ 1. _____

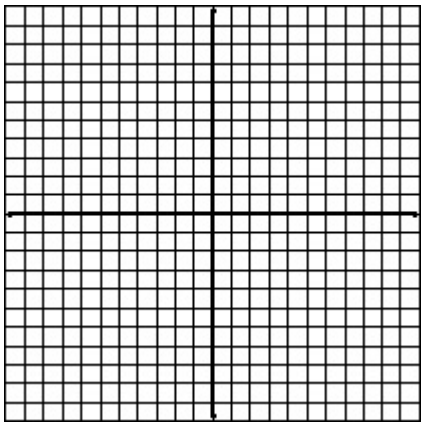
2. State the vertical asymptote(s) of the function $f(x) = \dfrac{3x-5}{4x^2+4x+1}$ 2. _____

3. State the equation of the oblique asymptote of $y = \dfrac{4x^2+10x-6}{x+2}$ 3. _____

4. Evaluate: $\lim\limits_{x \to \infty} \dfrac{-3x^2+5x^3+7}{6x^3+x^2-2}$ 4. _____

5. Sketch a graph of a function *f* that satisfies these conditions. [2]

- points (-1,10) and (3,1) are local extrema on the graph
- (1,3) is an inflection point
- the graph is concave down only when x < 1
- the x-intercept is - 4 and the y-intercept is 8



6. Let $f(x) = \dfrac{3x^3+2x^2+x+1}{x^2+x-2}$. What types of asymptotes does $f(x)$ have?

a. horizontal and vertical asymptotes
b. oblique and vertical asymptotes
c. horizontal and oblique asymptotes
d. None

7. Which function has an oblique asymptote?

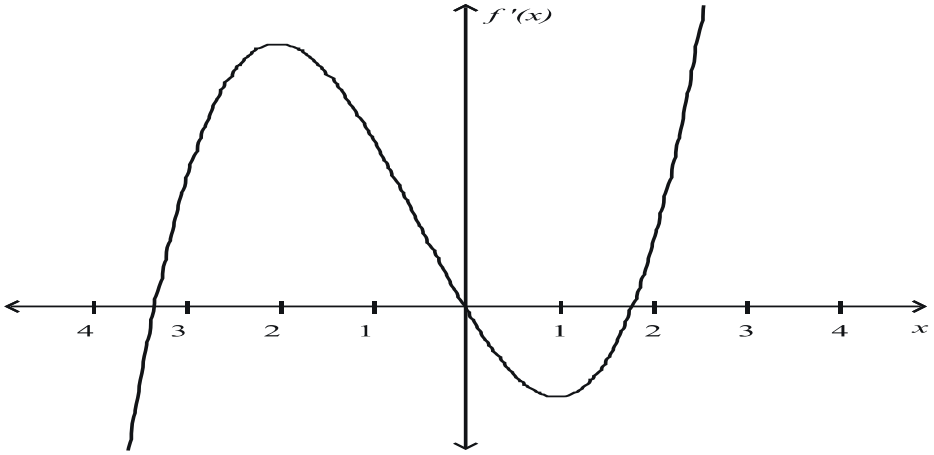
a. $f(x) = \dfrac{2x^2-x}{3x^2+1}$

b. $f(x) = \dfrac{x^3+x+2}{x^2-3x+7}$

c. $f(x) = \dfrac{x-3}{x^2-4x+3}$

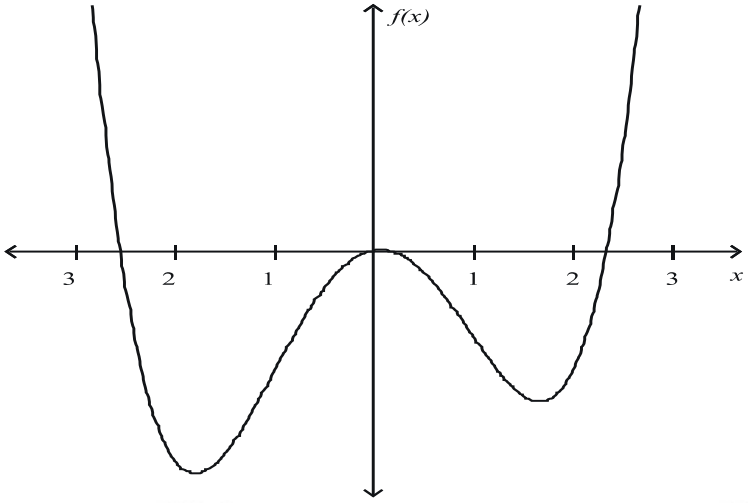
d. $f(x) = \dfrac{x^2-2x+1}{x-1}$

8. Below is the graph of $f'(x)$. For what value(s) of x does $f(x)$ have a point of inflection?



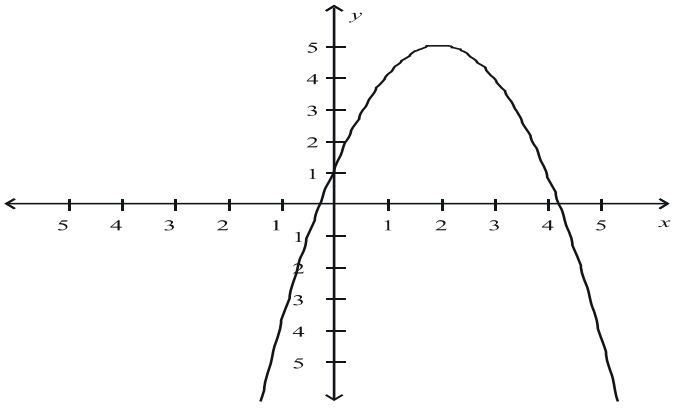
a. $x = -2$
b. $x = 1$
c. $x = -2$ and $x = 1$
d. $x = 0$

9. Below is the graph of $f(x)$. For what values of x is $f(x)$ concave down?



a. $x < -1$
b. $-1 < x < 1$
c. $x > 1$
d. $x < -1$ and $x > 1$

10. Which of the following is true for the interval $(2, \infty)$ for the graph of $f(x)$ shown below?



a. $f'(x) > 0, f''(x) > 0$
b. $f'(x) > 0, f''(x) < 0$
c. $f'(x) < 0, f''(x) > 0$
d. $f'(x) < 0, f''(x) < 0$

11. If $f(x)=\dfrac{x^2-1}{x^2+1}$, determine the domain, intercepts, asymptotes, intervals of increase and decrease, local extrema, points of inflection and concavity. Please use both interval charts in your solution. Graph the function. [12]

12. The point (-1, 5) is a point of inflection on the graph of $f(x)=2x^3+mx^2-3x+n$
Determine the values of *m* and *n*. [4]

13. Determine the conditions on the parameter *k*, such that the function $f(x)=\frac{2x+4}{x^2-k^2}$ will have critical points. [4]

14. If the graph of the function $g(x)=\frac{ax+b}{(x-1)(x-4)}$ has a horizontal tangent at point (2,-1), determine the values of *a* and *b*. [4]

15. What is an inflection point? How do you identify points of inflection? /3

16. Use the ***second derivative test*** to show that $f(x) = x^3 - 3x^2$ has a local maximum at the origin.

[4]

17. Below is the graph of $f'(x)$. Sketch a possible graph of $f(x)$. [3]