

Grade 12 Calculus and Vectors MCV4U

Chapter 4 Quiz 1

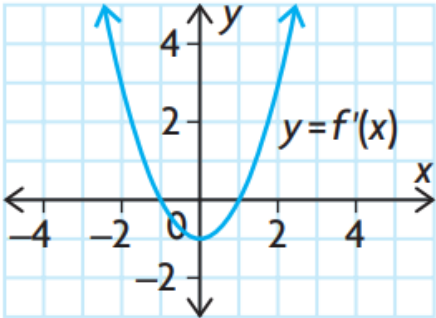
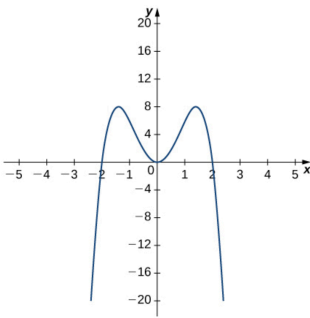
Section A: Multiple Choice Questions

1. For the function $f(x) = \frac{1}{x-3}$, what value is excluded from the domain? (1K)
 - A). $x = 0$
 - B). $x = 3$
 - C). $x = -3$
 - D). All real numbers are allowed
2. A function is increasing on an interval if: (1K)
 - A). $f(x) > 0$ for all x in the interval
 - B). $f'(x) > 0$ for all x in the interval
 - C). $f''(x) > 0$ for all x in the interval
 - D). The function has a local maximum on the interval
3. The derivative of a function at a point represents: (1K)
 - A). The area under the curve
 - B). The slope of the secant line
 - C). The average value of the function
 - D). The slope of the tangent line at that point
4. What does it mean if $f'(x) = 0$ for all x in an interval? (1K)
 - A). The function is increasing
 - B). The function is decreasing
 - C). The function is constant on that interval
 - D). The function is concave up

Section B: Problem-solving Questions

5.

(2A)

Given $g'(x)$, sketch $g(x)$. 	$g(x)$
Give $f(x)$, sketch $f'(x)$. 	$f'(x)$

(2A)

6. Find the intervals of increase and decrease for the function defined by

$$f(x) = 2x^3 - 9x^2 + 12x - 5.$$

(3T)

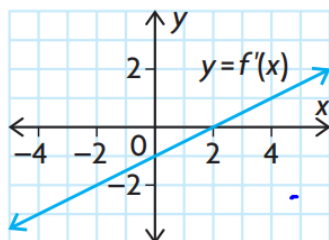
7. Determine whether $f(x) = \frac{3x^2+1}{x^2-4x+4}$ has any asymptotes. If so, identify the x and y values of the asymptotes.

(3K)

8. The following graph represents the derivative function $f'(x)$ of a function $f(x)$. Determine

- the intervals where $f(x)$ is increasing
- the intervals where $f(x)$ is decreasing
- the x -coordinate for all local extrema of $f(x)$.

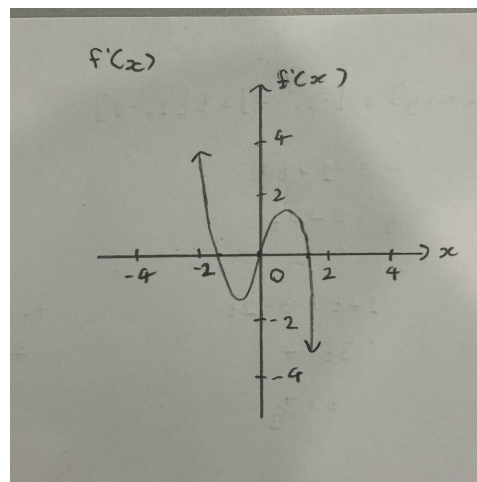
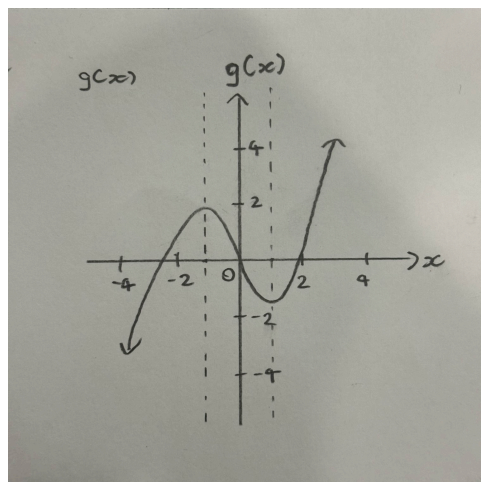
(3A)



Solutions

1. B). $x = 3$
2. B). $f'(x) > 0$ for all x in the interval
3. D). The slope of the tangent line at that point
4. C). The function is constant on that interval

5.



6. $f'(x) = 6x^2 - 18x + 12$

When $f'(x) = 0$, $6x^2 - 18x + 12 = 0$

$$(x - 2)(x - 1) = 0$$

Critical points: $x = 1$ and $x = 2$

Verify if the critical points are defined by substituting in $f(x)$.

	$(-\infty, 1)$	$f'(x) = 0$	$(1, 2)$	$f'(x) = 0$	$(2, \infty)$
$f'(x)$	$x = 0$, then +	1	$x = 1.5$, then -	2	$x = 3$, then +
$f(x)$	increase	max	decrease	min	increase

✓ Increasing: $(-\infty, 1) \cup (2, \infty)$

Decreasing: $(1, 2)$

$$7. \quad f(x) = \frac{3x^2+1}{x^2-4x+4}$$

$$x^2 - 4x + 4 = 0$$

✓ Vertical asymptote: $x = 2$

$$8. \quad \text{✓ i. } x > 2$$

$$\text{ii. } x < 2$$

$$\text{iii. } x = 2$$

$$\frac{3x^2}{1x^2} = 3$$

✓ Horizontal asymptote: $y = 3$