

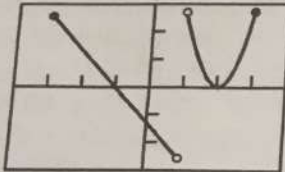
DATE 10/10/2019NAME Sannah Alimi**Test A Chapter 3**

Directions: Show all steps leading to your answers, including any intermediate results obtained using a graphing utility. Use the back of the test or another sheet of paper if necessary.

1. Use the definition of the derivative to find the derivative of

$$f(x) = 4x^2 - 3 \text{ at } x = 2. \text{ Show your work.}$$

2. Sketch the possible graph of a continuous function f that has domain $[-3, 3]$, where $f(-1) = 1$ and the graph of $y = f'(x)$ is shown below.



$[-4, 4]$ by $[-3, 3]$

3. Which of the following describes the behavior of $y = \sqrt[3]{x+2}$

at $x = -2$?

- (A) differentiable (B) corner
(C) cusp (D) vertical tangent
(E) discontinuity

4. Let $f(x) = \text{int } x$.

(a) Find $\text{NDER}(f(x), 3)$.

(b) Is your answer to part (a) a meaningful estimate of a derivative of $f(x)$? Explain.

5. Find all values of x for which the function

$$f(x) = \frac{x^2 + 10x + 25}{x^2 - 6x + 8} \text{ is differentiable.}$$

6. Find (a) $\frac{dy}{dx}$ and (b) $\frac{d^2y}{dx^2}$ if $y = 3x^5 + 7x^4 - 2x^2 + 4x$.

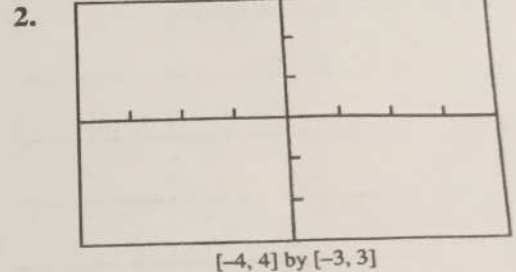
7. Does the curve $y = x^3 + 5x^2 + 6$ have any horizontal tangents? If so, where?

8. Find $\frac{dy}{dx}$ if $y = (x^3 + 5)(x^2 + 7)$.

9. Suppose that u and v are differentiable at $x = 5$ and that $u(5) = 7$, $v(5) = 2$, $u'(5) = -3$, and $v'(5) = 6$.

Find (a) $\frac{d}{dx}\left(\frac{u}{v}\right)$ and (b) $\frac{d}{dx}(10uv)$ at $x = 5$.

1. _____



$[-4, 4]$ by $[-3, 3]$

3. _____

4. (a) _____

(b) _____

5. _____

6. (a) _____

(b) _____

7. _____

8. _____

9. (a) _____

(b) _____

10. Find $\frac{dy}{dx}$.

(a) $y = 5x^{-3} - 6x^4 + \frac{1}{x}$

(b) $y = \sqrt{x} + \frac{3}{\sqrt{x}}$

11. A particle moves along a line so that its position at any time $t \geq 0$ is given by the function $s(t) = 4t^3 - 2t^2 + 1$, where s is measured in feet and t is measured in seconds.

- (a) Find the displacement during the first 3 seconds.
 (b) Find the average velocity during the first 3 seconds.
 (c) Find the instantaneous velocity when $t = 3$.
 (d) Find the acceleration of the particle when $t = 3$.
 (e) At what value or values of t does the particle change direction?

12. The coordinates of s of a moving body for various values of t are given.

t (sec)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
s (ft)	-19.5	-6	4.5	12	16.5	18	16.5	12	4.5

- (a) Plot s versus t , and sketch a smooth curve through the given points.
 (b) Assuming this smooth curve represents the motion of the body, estimate the velocity at $t = 1.0$, $t = 2.5$, and $t = 3.5$.

13. The number of gallons of water in a tank t minutes after the tank has started to drain is $Q(t) = 250(40 - t)^2$.

- (a) How fast is the water running out at the end of 10 min?
 (b) What is the average rate at which the water flows out during the first 10 min?

14. Find $\frac{dy}{dx}$ if $y = \frac{\cos x}{1 + \tan x}$.15. A body is moving in simple harmonic motion with position function $s(t) = 2 + \cos t$ (s in meters, t in seconds). Find the jerk at time t .16. Find the points on the graph of $y = \sec x$, $0 \leq x \leq 2\pi$, where the tangent is parallel to the line $3y - 2x = 4$.

10. (a) _____

(b) _____

11. (a) _____

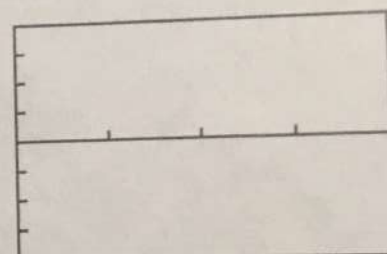
(b) _____

(c) _____

(d) _____

(e) _____

12. (a)



[0, 4] by [-20, 20]

(b) $t = 1.0$: _____ $t = 2.5$: _____ $t = 3.5$: _____

13. (a) _____

(b) _____

14. _____

15. _____

16. _____