

Differentiability & Continuity Stations

Name _____

D	1.		
E_I	2.		
R	3A.	3B.	3C.
I_I	4A.	4B.	
V	5A.	5B.	
A	6A.	6B.	

T	7A.	7B.	
	7C.	7D.	
I₂	8A.	8B.	
	8C.	8D.	
V	9A.	9B.	
	9C.	9D.	
E₂	10A.	10B.	
	10C.	10D.	
S	11A.	11B.	11C.

D

1. Use the limit definition of the derivative to find $f'(x)$, given $f(x) = x^3 - 2x$. Use proper notation.

E₁

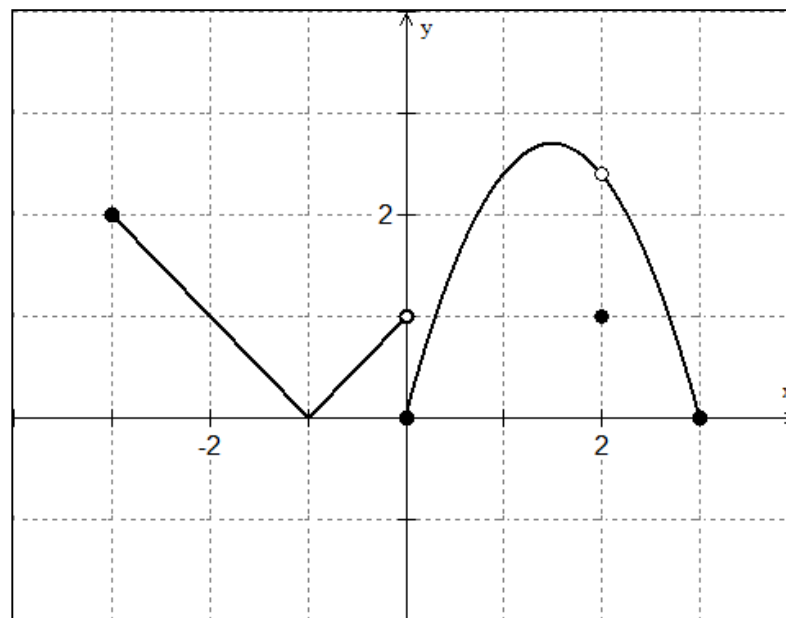
$$f'(c) = \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c}$$

2.) Use the alternate definition of the derivative to determine whether or not the function is differentiable at $x = 1$.

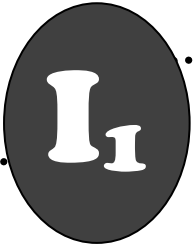
$$f(x) = \begin{cases} x, & x \leq 1 \\ x^2, & x > 1 \end{cases}$$

R

3.) The graph of function $f(x)$ over the interval $[-3, 3]$ is shown. At what domain points does the function appear to be



- A) Differentiable?
- B) Continuous, but not differentiable?
- C) Neither continuous nor differentiable?



4.) Find the x -coordinates of all points on the graph of $y = x^3 - 4x^2 + 5x$

A.) at which the tangent line is horizontal.

B.) at which the tangent line is parallel to the line $2y - 10x - 7 = 0$

V

5.) Find k such that the line is tangent to the graph of the function.

Function

Line

A.) $f(x) = x^2 - kx$ $y = 4x - 9$

B.) $f(x) = k\sqrt{x}$ $y = x + 4$



6.) If $s(t) = t^3 + t^2 - t - 1$ is the position of an object measured in feet per second.

A.) Find the average velocity between $t = 1$ and $t = 2$.

B.) Find the instantaneous velocity at $t = 1$.

T

7.) Find the derivative, simplify so that there are no negative exponents.

A.) $f(x) = 3\sqrt[4]{x}$

B.) $y = \frac{2}{x} - 4 \cos x$

C.) $g(x) = 4\sqrt{x} - 9\sqrt[3]{x}$

D.) $h(x) = \frac{6}{\sqrt[3]{x}} + 3 \cos x$

I₂

8.) Use the product rule to differentiate:

A.) $g(x) = x^3 \cos x$

B.) $f(x) = \sqrt{x} \sin x$

C.) $h(t) = t^2 \sin t$

D.) $f(\theta) = (3 \tan \theta)(\theta^2 - 2\sqrt{\theta})$

V

9.) Use the quotient rule to differentiate:

A.) $f(x) = \frac{\sin x}{x^2}$

B.) $g(x) = \frac{x}{\sqrt{x}-2}$

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

D.) $f(x) = \frac{x^3+5x+3}{x^2-1}$

E₂

10.) Use the Chain Rule to differentiate:

A.) $y = (2x - 7)^3$

B.) $f(x) = (9 - x^2)^{\frac{2}{3}}$

C.) $y = 3 \tan 4x$

D.) $g(\theta) = \frac{1}{4} \sin^2 2\theta$

S

11.) Consider the functions f and g . If $h = f \circ g$:

A.) Find $h'(1)$

B.) Find $h'(0)$

C.) Does $h'(2)$ exist?

