

# Differentiability & Continuity ***STATIONS ACTIVITY***



## Task Cards

**I<sub>1</sub>**

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  $2y - 10x - 7 = 0$ .

Engaging!  
Fun!



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## Differentiability and Continuity Stations Activity

Use this activity as mid-unit review for **Differentiability and Continuity**. The concepts will help your students work through the rules for differentiation (including Chain Rule), derivatives by the limit process, symbolic differentiation, and graphic representations of derivatives.

Teaching Suggestions:

- Use the set as a group rotation activity for 2-4 per group .
- Use the cards as a review activity prior to assessing students.

You may be interested in purchasing the [Definition of Derivatives Match-Up Activity](#).

**D**

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

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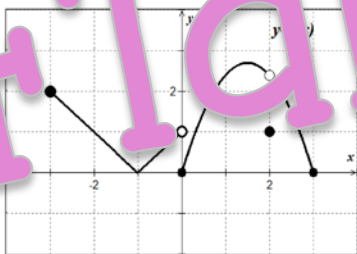
**E<sub>1</sub>**

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

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

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

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**R**

3. The graph of the function  $f(x)$  on the interval  $[-3, 3]$  is shown. At what domain points does the function appear to be
- Differentiable?
  - Continuous, but not differentiable?
  - Neither continuous nor differentiable?

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**E<sub>1</sub>**

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  $y - 4x - 7 = 0$ .

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**V<sub>1</sub>**

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

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**A**

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

- Find the average velocity between  $t = 1$  and  $t = 2$ .
- Find the instantaneous velocity at  $t = 1$ .

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**T**

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

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

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

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

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

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**I<sub>2</sub>**

8. Use the product rule to differentiate:

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

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

G)  $h(t) = t^2 \sin t$

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

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**V<sub>2</sub>**

9. Use the quotient rule to differentiate:

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

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

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

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

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**I<sub>2</sub>**

10. Use the Chain Rule to differentiate:

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

B)  $g(x) = (9 - x^2)^{2/3}$

G)  $y = \tan(4x)$

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

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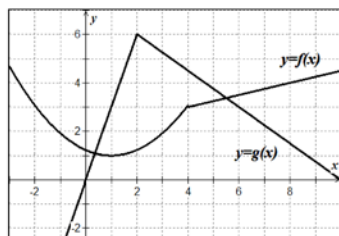
**S**

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

A) Find  $h'(1)$

B) Find  $h'(0)$

G) Does  $h'(2)$  exist?



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Differentiability & Continuity Stations Name \_\_\_\_\_

**D**

1.

**E<sub>1</sub>**

2.

**R**

3A.

3B.

**I<sub>1</sub>**

4A.

4B.

**V**

5A.

5B.

**A**

6A.

6B.

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**T**

7A.

7B.

7C.

7D.

**I<sub>2</sub>**

8A.

8B.

8C.

8D.

**V**

9A.

9B.

9C.

9D.

**E<sub>2</sub>**

10A.

10B.

10C.

10D.

**S**

11A.

11B.

11C.

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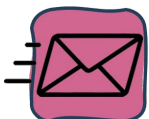
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