

## Analytical Representations and Critical Points

You're given analytical information (formulas) about three functions. In each case, you're asked to find and classify the critical values of the function. First, answer each question as well as you can individually. You may consult with others in your group for hints about solutions if needed, but your written solutions should be individual efforts. *Any verbal answers should be written using complete sentences.*

1. Suppose  $f'(x) = (x - 1)(x - 2)^2(x - 3)^3$ . (Note: this is a formula for the *derivative* of the original function). Use the following table to find and classify the critical points for the original function  $f(x)$ .

Steps	Notes and Solutions
<p>a. Consider the domain of <math>f'(x)</math>. Are there any values that <math>x</math> cannot be?</p>	
<p>b. Find the critical numbers for <math>f(x)</math>. (Note: For this problem, the function <math>f(x)</math> will have <u>three</u> critical numbers.)</p>	
<p>c. Classify each critical number as a <i>local maximum</i>, a <i>local minimum</i>, or <i>neither</i>, and explain your reasoning.</p>	<p>Critical number:</p>
	<p>Critical number:</p>

Steps	Notes and Solutions
<p><b>continued:</b></p> <p>Classify each critical number as a <i>local maximum</i>, a <i>local minimum</i>, or <i>neither</i>, and explain your reasoning.</p>	<p>Critical number:</p>

2. Suppose that  $g(x) = \frac{(x+1)^2}{x^2+8}$ .

a. What is the domain of  $g(x)$ ?

b. Compute  $g'(x)$  and find the critical numbers of  $g(x)$ . (**Note:** For this problem, the function  $g(x)$  will have two critical numbers.)

- c. Classify each of the critical numbers found in part b. Is each a local minimum, local maximum, or neither?

### Check your understanding

Suppose you are given an analytical representation of a function (a *formula* for the function). How would you identify *all* the critical values of the function?