Application of Derivatives Part One
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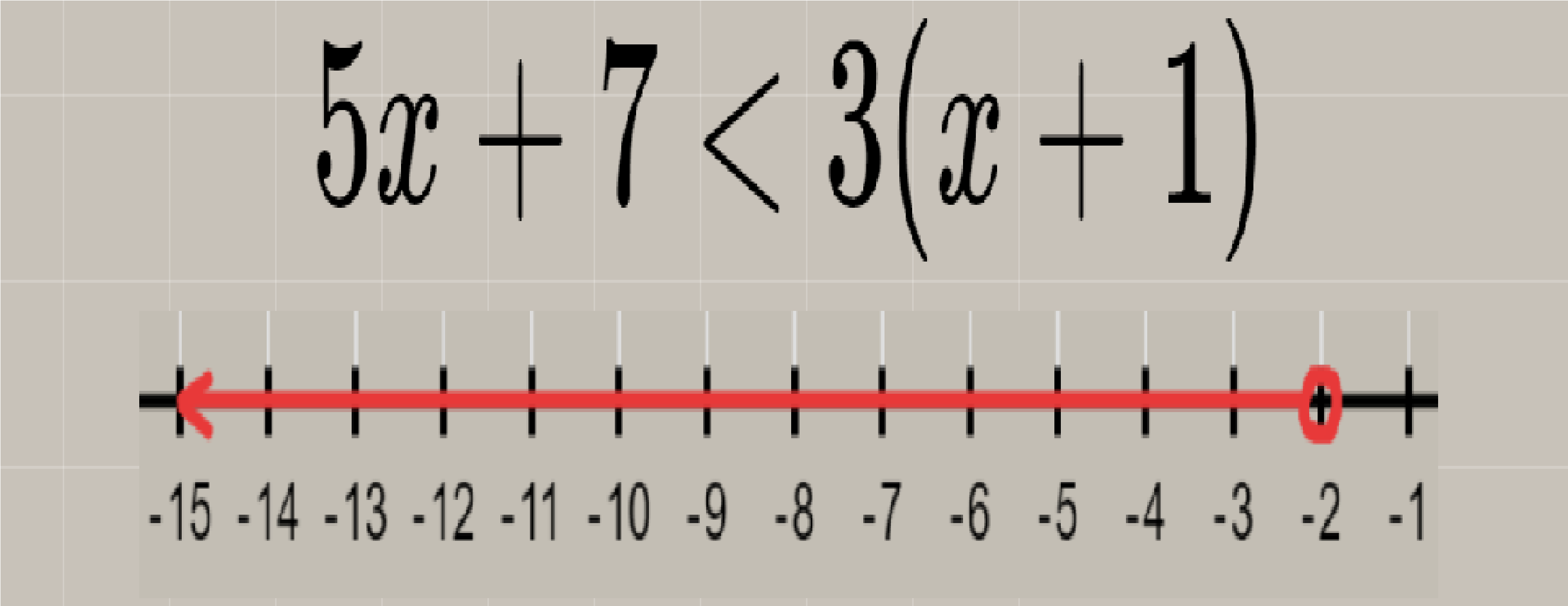

1. Application of Derivatives Part One

1.1 Sketching

It is important to sketch out the function in the question to reveal all of its qualities (increasing/decreasing intervals, concave up/down, inflection points, etc). There is an algorithm to determine all of the details of the graph.

1. From the original graph:
   - You must first **factor** to check if any **holes** are in the graph.
   - State **VA's** and **Domain**.
   - Find the **end behaviour**.
   - Look at the behaviour near **zeros** (x-intercepts) and **VA's**. (Remember - do this by looking at multiplicities of zeros)
   - *CAN BE SKIPPED* - Find **postive and negative intervals** between zeros and VA's.

2. From the first derivative:
   - Find **critical points**.
   - *CAN BE SKIPPED* - Find **increasing/decreasing intervals**.

3. From the second derivative:
   - Find possible **inflection points**.
   - Find **concave up/down intervals**.
   - Decide if the possible inflection points found are actual inflection points and classify the critical points using the 2nd derivative test.

1.2 Velocity and Acceleration

Before we start doing problems involving velocity and acceleration, we must make sure we know these key definitions:

Displacement

Displacement is the **change in position** of an object. It is concerned with the initial position of an object to its final position.

$$Displacement = s(t)$$

Velocity

$$Velocity = v(t) = \frac{ds}{dt} = \frac{\Delta s}{\Delta t}$$

Acceleration

$$Acceleration = a(t) = \frac{d^2v}{dt^2}$$

Jerk/Turbulence:

$$Jerk/Turbulence = j(t) = \frac{da}{dt} = \frac{d^2v}{dt^2} = \frac{d^3s}{dt^3}$$

1.3 Other Applications