

Introduction to the Derivative

Instantaneous Rate of Change:

Alternative Definition of the Derivative:

Definition of the Derivative:

What are the similarities and differences between the equations above?

Example #1:

Given $g(x) = x^2 - x$.

A. Use the definition of the derivative to find the slope of the tangent line of g at any point x .

B. Find the equation of the tangent line at $(4, g(4))$

Example #2:

Given $f(x) = \sqrt{x - 1}$.

A. Use the definition of the derivative to find the slope of the tangent line of f at any point x .

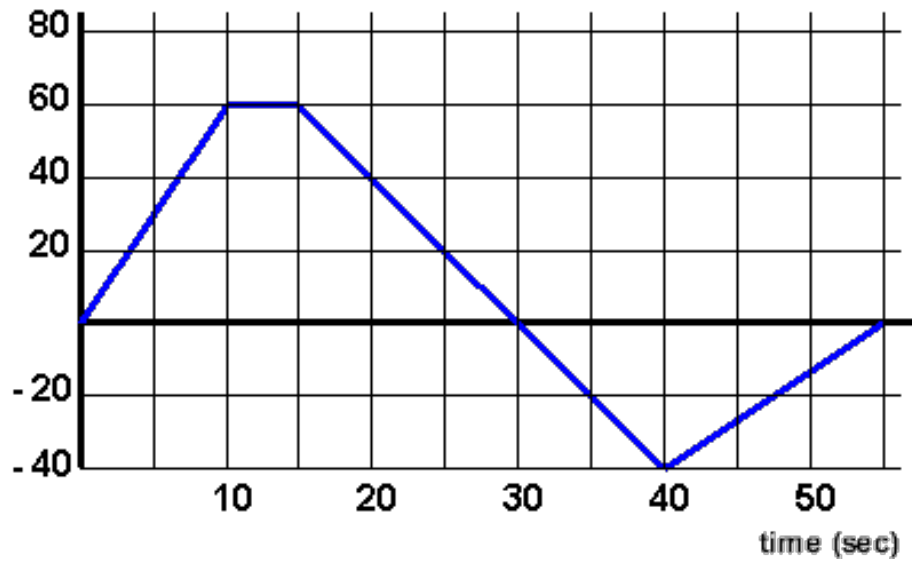
B. Find the equation of the tangent line and the normal line at $x=2$

**The normal line is perpendicular to the tangent line at the point of tangency.

Lesson #21

Example #3: Position vs. Time Graph

position (m)

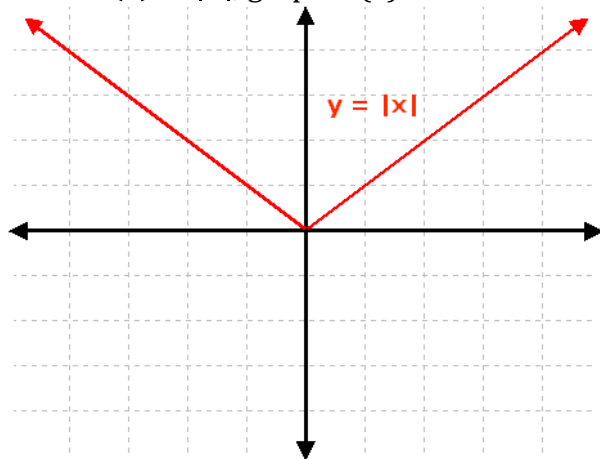


A. Estimate the instantaneous velocity at $t = 20$ seconds.

B. Graph **Velocity vs. Time**.

Example #4:

Given $h(x) = |x|$, graph $h'(x)$.

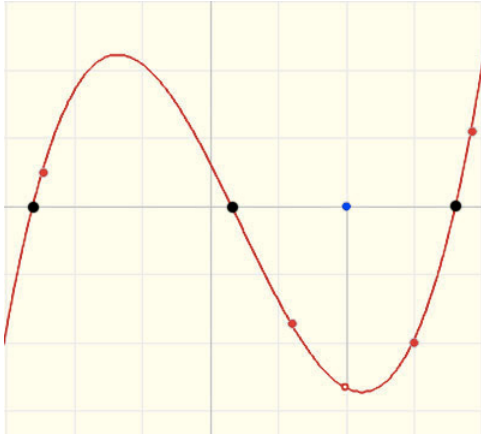


Rule for Derivatives:

Lesson #21

Example #5: Graph the derivative for each function.

a)



b)

