The Limit Definition of Derivative

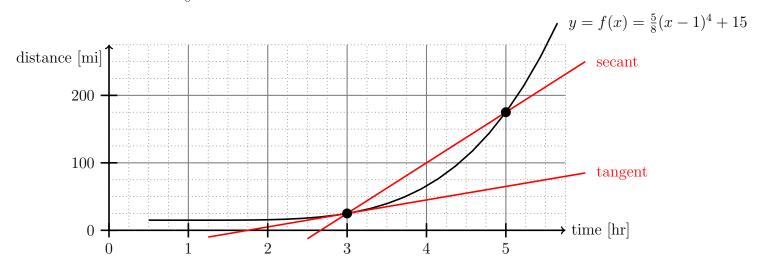
Suppose the distance a train has traveled is a function of time y = f(x). y = f(x)distance [mi] secant y_2 x_2 tangent x_1 y_1 → time [hr] x + hxaverage slope of average rate of definition of velocity secant change difference over between = over quotient [x,x+h]x, x+h[x, x+h]

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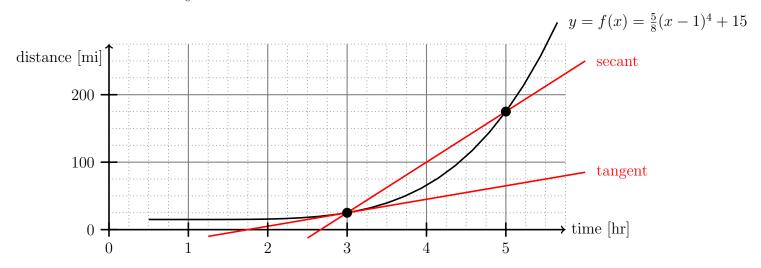
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 $h \rightarrow$

- **Exercise 1.** Use the definition of difference quotient to find the slope of the **secant** line through $y = f(x) = \frac{5}{8}(x-1)^4 + 15$ between x and x + h.
- **Exercise 2.** Use the definition of derivative to find the slope of the **tangent** line to $y = f(x) = \frac{5}{8}(x-1)^4 + 15$ at x.



- **Exercise 3.** Use the **diagram** to estimate the slope of the **secant** line to $y = f(x) = \frac{5}{8}(x-1)^4 + 15$ between 3 and 5.
- **Exercise 4.** Use your answer to Exercise 2 above to estimate the slope of the **tangent** line to $y = f(x) = \frac{5}{8}(x-1)^4 + 15$ at 3.
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