Estimate the instantaneous rate of change for the function $f(x) = 0.5x^2 + 6.5x - 15$ at the point x=1 using centered interval method.
Check that your answer is reasonable by graphing.

Estimate the instantaneous rate of change for the function $f(x) = 0.5x^2 + 6.5x - 15$ at the point x = -6.5 using preceding/following method.
Check that your answer is reasonable by graphing.

Estimate the instantaneous rate of change for the function $f(x) = 4\sin(2x) + 1$ at $x = 45°$ using the centered interval method.
Check that your answer is reasonable by graphing.

Estimate the slope of the tangent line to the function $f(x) = x^3 + 1$ at x = 2.
Check your answer is reasonable by graphing.

Determine the average population change between 2009 and 2015 of a city whose population is described by the function
$P(t) = -1.5t^2 + 36t + 6$,
where t is the number of years after 2000.
Check that your answer is reasonable by graphing.

To make a snow person, snow is being rolled into the shape of a **sphere**.
Determine the average rate of change of the volume with respect to the radius between r = 2 and r =6.

To make a snow person, snow is being rolled into the shape of a sphere.
Determine an estimate for the instantaneous rate of change of the volume with respect to the radius at $r = 3\,cm$.
Explain what the instantaneous rate of change means in this situation.

Difference Quotient

$f(x) = x^2 + 5$

Determine the instantaneous rate of change at x=3 using a **tiny following interval**.

Check the reasonableness of your answer with a sketch.

Difference Quotient

My goal is to make the interval of the tiny following numbers, so small it is basically 0

(3, 3.000000000000)

(3, 3+h)

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$\frac{\Delta y}{\Delta x} = \frac{f(y_2) - f(y_1)}{x_2 - x_1}$

$f(x) = x^2 + 5$

$M_T @ 3$

$M_T = \lim_{h \to 0} \frac{f(x+h) - f(x)}{x+h-x}$

$= \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

$M_T = \lim_{h \to 0} \frac{f(3+h) - f(3)}{h}$

$= \frac{(h^2+6h+14) - (14)}{h}$

$h \to 0 = \frac{h^2+6h}{h}$

$= \frac{h(h+6)}{h}$

$h \to 0 = h + 6$

$= 0 + 6$

$= 6$

$f(x) = x^2 + 5$

$f'(x) = 2x + 0$

$= 2x$

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Find M_T @ $x = 1$

for $f(x) = x^2 - x - 12$

Find M_T @ $x = 5$

for $f(x) = x^2 - 10x + 24$

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$f(x) = -2x^2 + 3$

What is M_T at $x = 4$

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Sep 24-11:51 AM