BOARD PROBLEMS CH. 9

1) $$\lim_{x \to -\infty} \frac{2x^2}{x^2-4}$$

2) $$\lim_{x \to 0} \frac{\cos\left(\frac{\pi}{2} - x\right)}{x}$$

3) $$\lim_{x \to -2} -\frac{x^2-4}{x+2}$$

4) WRITE GRAPHING AND STANDARD FORM OF A CIRCLE WITH:

ENDS OF A DIAMETER $(11, 6)$ $(1, 14)$

Ch. 9 - DEF OF A DERIVATIVE

RATE OF CHANGE

EXAMPLES: ____________

____

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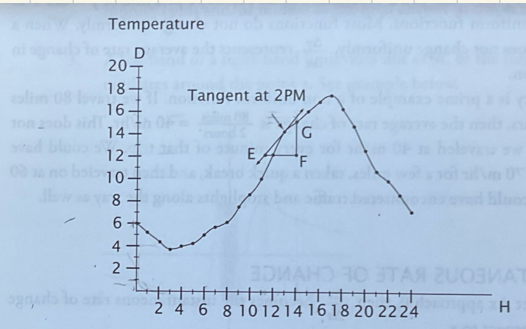
$\frac{dy}{dx} = m$ or slope

so the derivative of a function reprents slope.

AVERAGE RATE OF CHANGE

LIKE velocity = $\frac{\text{total miles}}{\text{total hours}}$



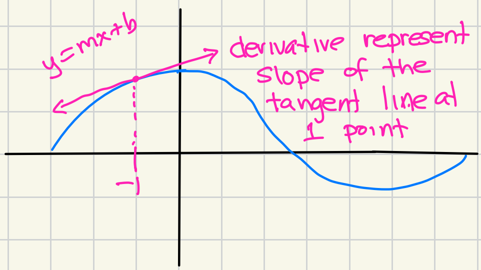
Find the average rate of change in Idaho's temperature with respect to time:

a. From midnight to 4 a.m.
b. From 11 a.m. to 3 p.m.
c. Estimate the instantaneous rate of change at 2 p.m.

INSTANTANEOUS RATE OF CHANGE

$\lim_{\Delta x \to 0} \frac{\Delta Y}{\Delta x}$

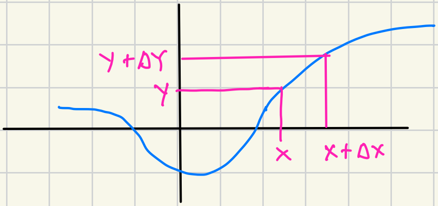
what does this mean?



DEFINITION OF A DERIVATIVE IN ONE VARIABLE

$$f'(x) = \frac{\Delta Y}{\Delta x} = \frac{dy}{dx} = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Proof of the derivative formula



① $y = f(x)$

FINDING A DERIVATIVE USING DEFINITION

$$y' = f'(x) = \frac{dy}{dx} = \frac{f(x+h) - f(x)}{h}$$

find $\frac{dy}{dx}$ for $y = 3x^2 + 5$ (or y')

$\boxed{\text{STEP 1}}$ replace x with $(x+h)$

$y = f(x)$ so $f(x+h) =$

$\boxed{\text{STEP 2}}$ Subtract $f(x)$

$\boxed{\text{STEP 3}}$ DIVIDE simplified form by h.

$\boxed{\text{STEP 4}}$ FIND THE LIMIT AS $h \to 0$

$\boxed{\text{EX 4}}$ $y = 2x - x^2$

$\boxed{\text{EX. 5}}$ $y = \dfrac{-4}{x}$

$\boxed{\text{EX. 6}}$ $y = 4x + 1$

$\boxed{\text{EX. 7}}$ $f(x) = 2\sqrt{x}$

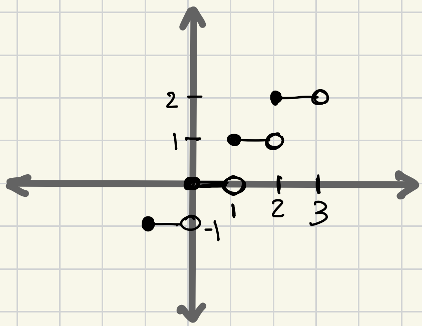
! IMPORTANT !

* NOTE * WHEN YOU HAVE A $\sqrt{}$ YOU MUST MULTIPLY BY THE CONJUGATE.

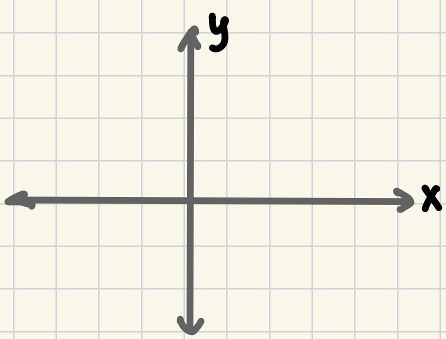
EX. 8 FIND THE DISTANCE BETWEEN $(0,-1)$ AND $(2,-3)$

GREATEST INTEGER FUNCTION

$f(x) = [x]$ for each value of x, $f(x)$ is the greatest INTEGER $\leq x$.



EX. 9 GRAPH $f(x) = [x] + 1$ for x in $[-1, 1]$



x	y
-1	
$-\frac{1}{2}$	
0	
$\frac{1}{2}$	
1	

Find $\frac{dy}{dx}$.

1. $f(x) = 6 - 2x$

2. $f(x) = 3x^2 + 7$

3. $f(x) = 4x^2 - x + 2$

4. $f(x) = 1 - 2x^3$

5. $f(x) = 2\sqrt{x}$

6. $f(x) = \frac{3}{x}$

7. $f(x) = \frac{-2}{1-x}$

8. $f(x) = \frac{1}{x} + 2x$