Test 1 !

Not a ton of feedback

Style – Completeness

FORMATIVE –vs– SUMMATIVE Assessments

Learning

Grade

All tests comprehensive !

So don't panic about Test 1.

12 hours per week

$|3-2x| > 7$

$3-2x > 7$ OR $3-2x < -7$

§1.7

See Solutions,
check for accuracy

If you can't resolve your & my work.

ASK.

New way to think of lines

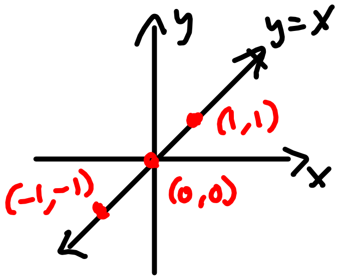
$y = m(x - x_1) + y_1$ from Point-Slope

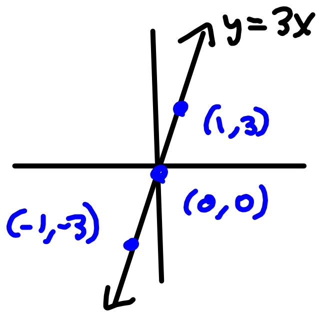
$f(x) = 3(x-2) + 5$

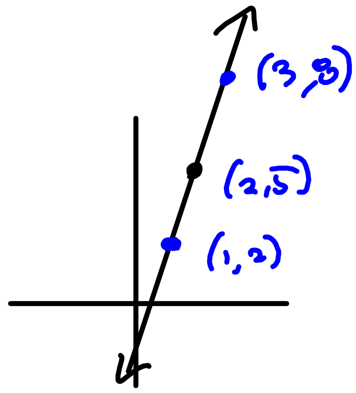
$(x, y) \to (x, 3y)$

Right 2

up 5



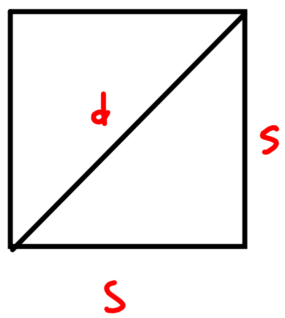




Every line is just "something we did to y=x."

$-1+2=1, \quad -3+5=2$

Now, Right 2, up 5



$A =$ area

$A = s^2 = \left(\frac{1}{4}P\right)^2$

"$s = s(d)$" means write 's' as function of d.

$s^2 + s^2 = d^2$

$2s^2 = d^2$

$s^2 = \frac{1}{2}d^2$

$s = \pm\sqrt{\frac{1}{2}d^2} = \pm\sqrt{\frac{1}{2}}\,d$

$= \pm\frac{\sqrt{2}\,d}{2}$

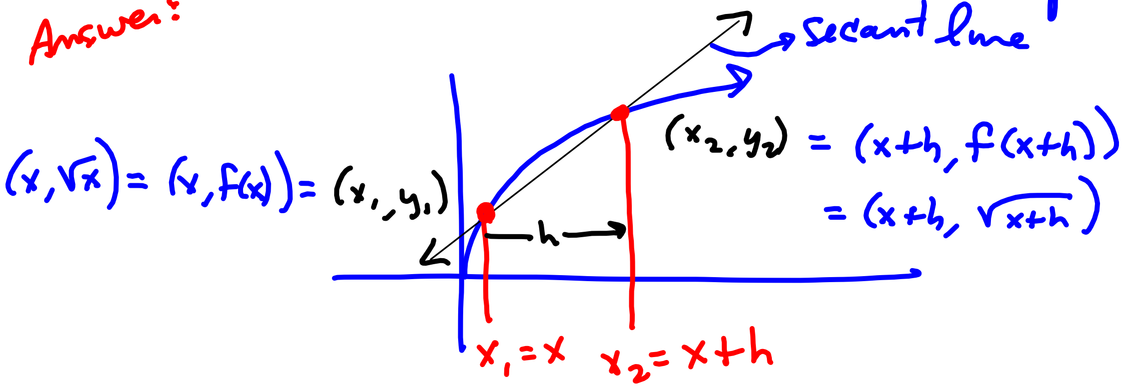
$P = 4s$

$s = \frac{1}{4}P$

Guaranteed Test Question

Use $f(x)=\sqrt{x}$ to illustrate the difference quotient.

Answer:



Slope of the secant line, connecting 2 points on the graph of $f(x)=\sqrt{x}$ is ...

$$m_{sec} = \frac{y_2-y_1}{x_2-x_1} = \frac{f(x+h)-f(x)}{x+h-x} = \frac{f(x+h)-f(x)}{h}$$

$$= \frac{\sqrt{x+h}-\sqrt{x}}{h}$$

Simplify the Difference quotient,

$m = \dfrac{f(x+h) - f(x)}{h}$ for $f(x) = \ldots$

Guaranteed Test question, something like $x^2 - 3x$ ...

... x^2 : $m = \dfrac{f(x+h) - f(x)}{h} = \dfrac{(x+h)^2 - x^2}{h}$

$= \dfrac{x^2 + 2xh + h^2 - x^2}{h} = \dfrac{2xh + h^2}{h} = \dfrac{h(2x+h)}{h}$

$= \boxed{2x+h}$

FOR BONUS, Let $h \to 0$ & do calculus!

$\xrightarrow{h \to 0}$ $2x$ = Slope of curve $y = x^2$ at any point, x.

for $f(x) = x^2$, $f'(x) = 2x$ is the DERIVATIVE of $f(x)$.

GIVES SLOPE on a CURVE!

Something we don't know how to do without Calculus.

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

$(a-b)(a+b)$
$= a^2 - b^2$

$$\frac{f(x+h) - f(x)}{h} = \frac{\sqrt{x+h} - \sqrt{x}}{h}$$

$$= \left(\frac{\overset{a}{\sqrt{x+h}} - \overset{b}{\sqrt{x}}}{h}\right)\left(\frac{\overset{a}{\sqrt{x+h}} + \overset{b}{\sqrt{x}}}{\sqrt{x+h} + \sqrt{x}}\right)$$

Bonus Question on $\sqrt{x}$ like this.

$$= \frac{\sqrt{x+h}^2 - \sqrt{x}^2}{h(\sqrt{x+h} + \sqrt{x})} = \frac{x+h-x}{h(\sqrt{x+h} + \sqrt{x})} = \frac{h}{h(\sqrt{x+h} + \sqrt{x})}$$

$$= \boxed{\frac{1}{\sqrt{x+h} + \sqrt{x}}} \xrightarrow[\text{Calculus!}]{\text{Now } h \to 0} \frac{1}{\sqrt{x} + \sqrt{x}} = \frac{1}{2\sqrt{x}} = f'(x)$$

This technique is "Rationalizing the Numerator" after years of teaching how to rationalize denominators.