

PC 1 (part 2) Review

1) Find and fully simplify the difference quotient for the function g below. $\frac{g(x+h)-g(x)}{h}, h \neq 0$

$g(x) = -3x$

$$\begin{aligned} \frac{g(x+h)-g(x)}{h} &= \frac{-3(x+h)-(-3x)}{h} \\ &= \frac{-3x-3h+3x}{h} \\ &= \frac{-3h}{h} \\ &= -3 \end{aligned}$$

2) Find and fully simplify the difference quotient for the function f below. $\frac{f(x+h)-f(x)}{h}, h \neq 0$

$f(x) = x^2 - 22x$

$$\begin{aligned} \frac{f(x+h)-f(x)}{h} &= \frac{(x+h)^2 - 22(x+h) - (x^2 - 22x)}{h} \\ &= \frac{x^2 + 2xh + h^2 - 22x - 22h - x^2 + 22x}{h} \\ &= \frac{2xh + h^2 - 22h}{h} = \frac{h(2x + h - 22)}{h} \\ &= 2x + h - 22 \end{aligned}$$

3) Point $B(-9,5)$ is on the graph of $y = f(x)$. Determine the location of point B' after the transformation shown. Describe the transformation steps in detail.

a) $f((x-2))+5$

$(-9,5) \rightarrow$ Add 2 to $x \rightarrow (-7,5)$
 $(-7,5) \rightarrow$ Add 5 to $y \rightarrow (-7,10)$

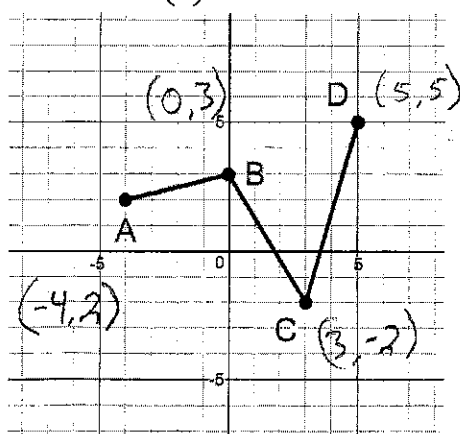
$(-7,10)$

b) $-5f\left(-\frac{1}{3}(x+4)\right) - 8$

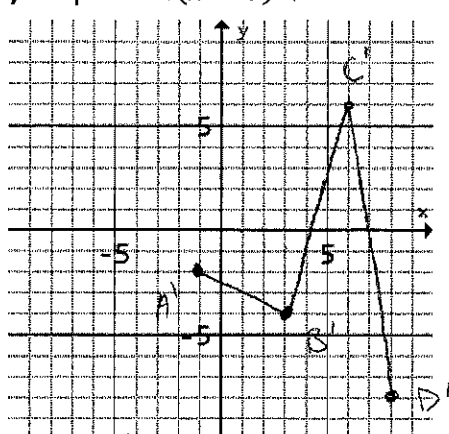
$(-9,5) \rightarrow$ Mult. x by $-3 \rightarrow (27,5)$
 $(27,5) \rightarrow$ Subtract 4 from $x \rightarrow (23,5)$
 $(23,5) \rightarrow$ Mult y by $-5 \rightarrow (23,-25)$
 $(23,-25) \rightarrow$ Subtract 8 from $y \rightarrow (23,-33)$

$(23,-33)$

$h(x)$ is below

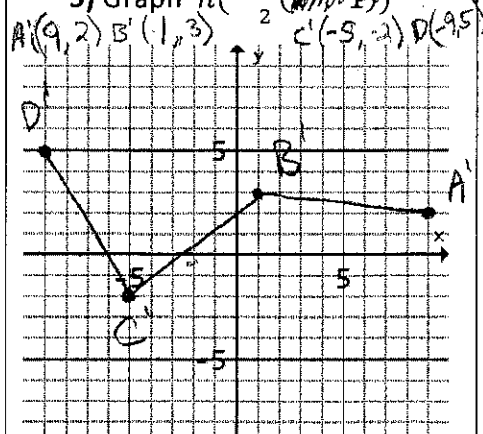


4) Graph $-2h(x-3)+2$



$A'(-1, -2)$ $B'(3, -4)$ $C'(6, 6)$ $D'(8, -8)$

5) Graph $h\left(-\frac{1}{2}(x-1)\right)$



$A'(9, 2)$ $B'(1, 3)$ $C'(-5, -2)$ $D'(-9, 5)$

6) Given $f(x) = -2x^2$,

a) Find the average rate of change from 4 to 6.

$$\frac{f(6) - f(4)}{6 - 4} = \frac{-72 - (-32)}{2} = \frac{-40}{2} = -20$$

b) Find an equation of a secant line through the points $(4, f(4))$ and $(6, f(6))$

$$y = -20x + b$$

$$-32 = -20(4) + b$$

$$-32 = -80 + b$$

$$48 = b$$

$$y = -20x + 48$$

7) Given $g(x) = x^2 + 3x$,

a) Find the average rate of change from 2 to 5.

$$\frac{g(5) - g(2)}{5 - 2} = \frac{40 - 10}{3} = \frac{30}{3} = 10$$

b) Find an equation of a secant line through the points $(2, f(2))$ and $(5, f(5))$

$$y = 10x + b$$

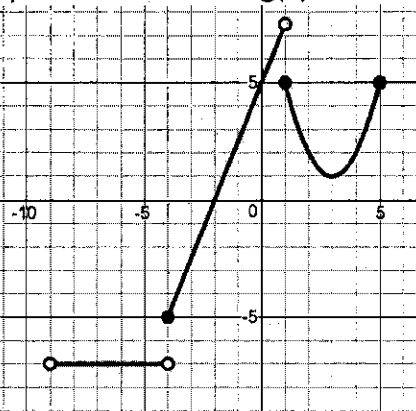
$$10 = 10(2) + b$$

$$10 = 20 + b$$

$$-10 = b$$

$$y = 10x - 10$$

8) a) Write the definition of the piecewise function $g(x)$ shown.



$$g(x) = \begin{cases} -5, & -10 \leq x < -5 \\ \frac{5}{2}x + 5, & -5 \leq x < 0 \\ (x-3)^2 + 1, & 0 \leq x \leq 5 \end{cases}$$

9) Use the graph of $g(x)$ to evaluate the following:

a) Evaluate $g(0) = 5$

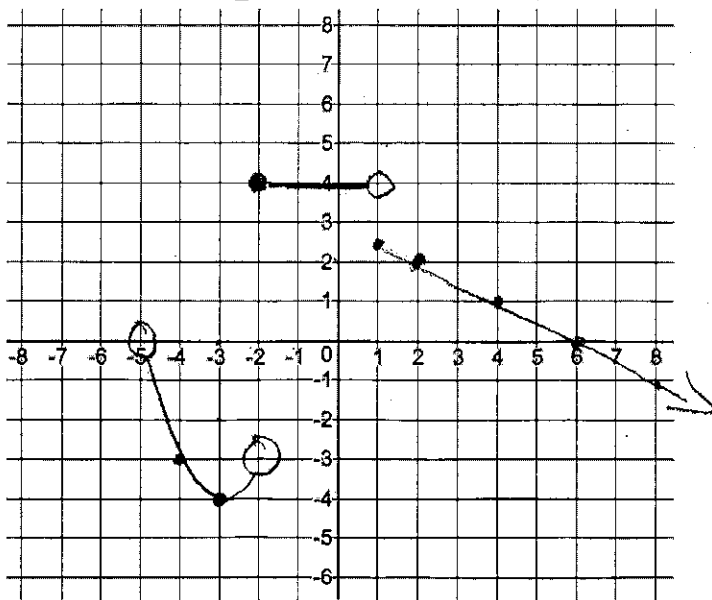
b) Evaluate $g(-4) = -5$

c) Solve $g(x) = 1$. Write as a set.

$$x \approx \{-1.5, 3\}$$

10) Graph the piecewise function

$$f(x) = \begin{cases} (x+3)^2 - 4 & \text{if } -5 < x < -2 \\ 4 & \text{if } -2 \leq x < 1 \\ -\frac{1}{2}x + 3 & \text{if } x \geq 1 \end{cases}$$



11) Use the graph of $f(x)$ to evaluate the following:

a) Evaluate $f(0) = 4$

b) Evaluate $f(-4) = -3$