MAT 1375, Classwork2, Fall2024

ID:_____ Name: Sol

1. Given a function $f(x) = x^2 + 4x - 9$. Find (a) $f(2)$ (b) $f(-3)$ (c) $\frac{f(x+h)-f(x)}{h}$

(a) $f(2) = (2)^2 + 4(2) - 9 = 4 + 8 - 9 = \boxed{3}$

(b) $f(-3) = (-3)^2 + 4(-3) - 9 = 9 - 12 - 9 = \boxed{-12}$

(c) $f(x+h) = (x+h)^2 + 4(x+h) - 9$

$= x^2 + 2xh + h^2 + 4x + 4h - 9$

$(x+h)^2 = (x+h)(x+h) = x^2 + xh + hx + h^2 = x^2 + xh + xh + h^2 = x^2 + 2xh + h^2$

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

$= \frac{2xh + h^2 + 4h}{h}$

$= \frac{h(2x + h + 4)}{h}$

$= \boxed{2x + h + 4}$

$\cdot f(x+h) - f(x)$

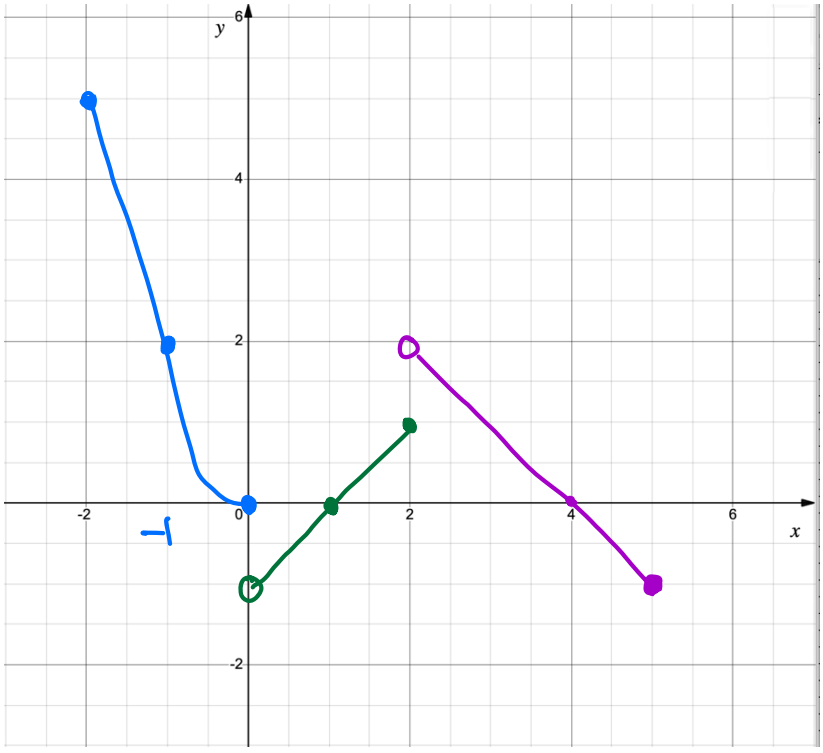
$= x^2 + 2xh + h^2 + 4x + 4h - 9 - (x^2 + 4x - 9)$

$= x^2 + 2xh + h^2 + 4x + 4h - 9 - x^2 - 4x + 9$

$= 2xh + h^2 + 4h$

2. Consider the function described by the following formula. What is the domain of this function? Graph the function f.

$$f(x) = \begin{cases} x^2 + 1 \ , for \ -2 < x \leq 0 \\ x - 1 \ , for \ 0 < x \leq 2 \\ -x + 4 \ , for \ 2 < x \leq 5 \end{cases}$$



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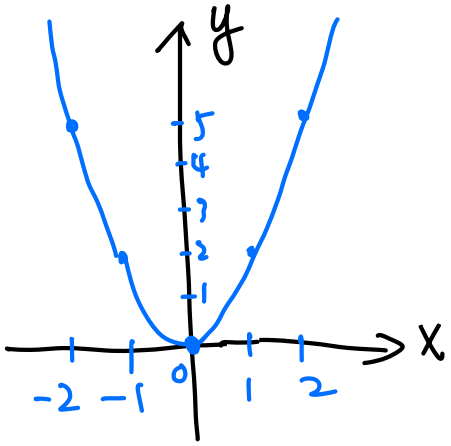
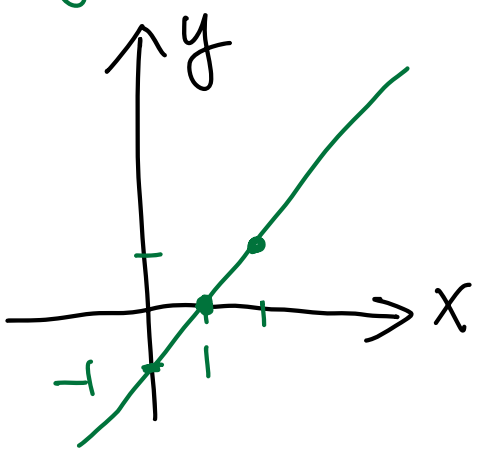
$y = x^2 + 1$

x	-2	-1	0	1	2
y	5	2	1	2	5



$y = x - 1$

x	1	0	2
y	0	-1	1



$y = -x + 4$

x	4	0	2
y	0	4	2