4.R Review

Today & Tomorrow's Entertainment:

p. 241 #12 * use desmos

pp. 240-241 #1b, 6acd, 7ad, 8cd, 10ad, 14c*, 15 +9?
* *not only find an estimate at $x=5$, but find the exact rate of change too, using **"first principles"***

p. 242 **Chapter Self-Test**
(allow a maximum of 45 minutes).
Corrections to inal answers:
#8a should only have "less than" inequality signs.
#8b - Answers may vary.

p. 240 **8.** Solve the following inequalities. State your answers using set notation.

a) $-3 < 2x + 1 < 9$
b) $8 \leq -x + 8 \leq 9$
c) $6 + 2x \geq 0 \geq -10 + 2x$

$6+2x-2x \geq 0-2x \geq -10+2x-2x$

$6 \geq -2x \geq -10$

$\frac{6}{-2} \leq \frac{-2x}{-2} \leq \frac{-10}{-2}$

$-3 \leq x \leq 5$

$\therefore \{x \in \mathbb{R} \mid -3 \leq x \leq 5\}$

$4 < x < 3$ No Sol'n

$2 < x < 3$ ✓

$3 > x > 2$ ✓

p. 241 **10.** Select a strategy and determine the interval(s) for which each inequality is true.

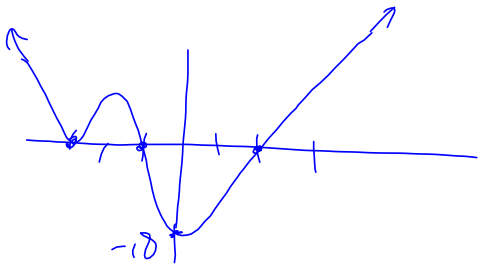
a) $(x+1)(x-2)(x+3)^2 < 0$

if $x = -1, 2, -3$

then $P(x) = 0$

$x < -3$	$-3 < x < -1$	$-1 < x < 2$	$x > 2$
$(-)(-)(+)$	$(-)(-)(+)$	$(+)(-)(+)$	$(+)(+)(+)$
$+$	$= +$	$= -$	$= +$
NO	NO	Yes	NO

$\therefore (-1, 2)$



p. 241 **10.** Select a strategy and determine the interval(s) for which each inequality is true.

d) $x^3 + x^2 - 21x + 21 \leq 3x^2 - 2x + 1$

$x^3 + x^2 - 3x^2 - 21x + 2x + 21 - 1 \leq 0$

$x^3 - 2x^2 - 19x + 20 \leq 0$

$b^2 - 4ac$

$= (-1)^2 - 4(1)(-20)$

$= 81$

1	1	−2	−19	20
	↓	1	−1	−20
	1	−1	−20	0 R

$\Rightarrow (x-1)(x^2 - x - 20) \leq 0$

$(x-1)(x-5)(x+4) \leq 0$

$x = 1, 5, -4$

$x < -4$	$-4 < x < 1$	$1 < x < 5$	$x > 5$
$(-)(-)(-)$	$(-)(-)(+)$	$(+)(-)(+)$	$(+)(+)(+)$
$= -$	$= +$	$= -$	$= +$
TRUE	NO	yes	NO.

$\therefore (-\infty, -4] \cup [1, 5]$

p. 241 **14.** For each of the following functions, determine the average rate of change in $f(x)$ from $x = 2$ to $x = 7$, and estimate the instantaneous rate of change at $x = 5$.

** not only find an estimate at x=5, but find the exact rate of change too, using **"first principles"***

c) $g(x) = 2x^3 - 5x$

14c) $g(x) = 2x^3 - 5x$

aroc = m_{secant}

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

$= \frac{[2(7)^3 - 5(7)] - [2(2)^3 - 5(2)]}{5}$

$= \frac{[686 - 35] - [16 - 10]}{5}$

$= \frac{651 - 6}{5}$

$= \frac{645}{5}$

$= 129$

∴ on average, y increases 129 units per unit of x, from x=2 to x=7.

iroc = $m_{tangent}$

$= \frac{g(5+h) - g(5)}{h}, h \to 0$

$= \frac{2(5+h)^3 - 5(5+h) - [2(5)^3 - 5(5)]}{h}, h \to 0$

$= \frac{2[5^3 + 3(5)^2 h + 3(5)h^2 + h^3] - 25 - 5h - [250 - 25]}{h}, h \to 0$

$= \frac{2[125 + 75h + 15h^2 + h^3] - 25 - 5h - 225}{h}, h \to 0$

$= \frac{250 + 150h + 30h^2 + 2h^3 - 25 - 5h - 225}{h}, h \to 0$

$= \frac{2h^3 + 30h^2 + 145h}{h}, h \to 0$

$= \frac{h(2h^2 + 30h + 145)}{h}, h \to 0$

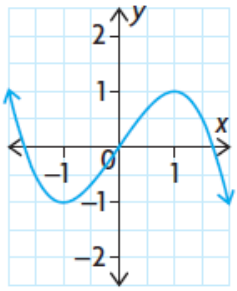
$= 2h^2 + 30h + 145, h \to 0$

$= 145$

∴ the iroc at $x = 5$ is 145

∴ at $x = 5$, the y-values are increasing 145 units for every unit of x.

p. 241 **15.** Given the following graph, determine the intervals of x where the instantaneous rate of change is positive, negative, and zero.



iroc = $m_{tangent}$

+	$(-1,1)$
−	$(-\infty,-1)\cup(1,\infty)$
0	$x=-1, x=1$