MTH 30 Homework

Section 1.7 | 4, 18, 38, 44, 54, 60.

#4 read the description in the book.

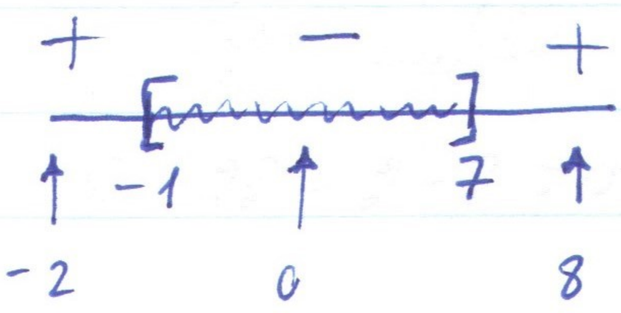
$(x+1)(x-7) \leq 0$

a) $(x+1)(x-7) = 0$.

$x+1=0 \qquad x-7=0$

$x=-1 \qquad x=7$

b)



c) $f(0) = 1\cdot(-7) = -7 < 0$

$f(-2) = -1\cdot(-9) = 9 > 0$

$f(8) = 9\cdot 1 = 9 > 0$

+ picture

d) ! include boundary points.

Answer: $[-1, 7]$ or $\{x \mid -1 \leq x \leq 7\}$

#18 $4x^2 + 1 \geq 4x$

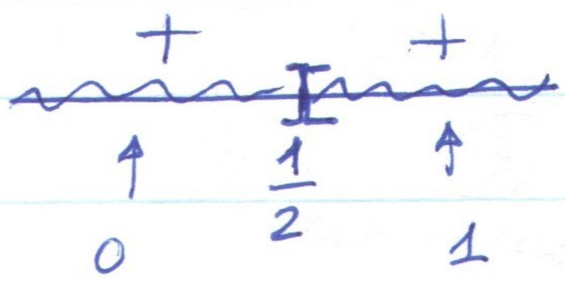
$4x^2 - 4x + 1 \geq 0$ - re-writing.

a) $4x^2 - 4x + 1 = 0$

$(2x-1)^2 = 0$

$2x-1=0 \qquad x = \frac{1}{2}$

b)



c) $f(0) = 0 - 0 + 1 > 0$

$f(1) = 4 - 4 + 1 > 0$

d) ! take boundary points.: Answer: $\mathbb{R}$

#38 $x^3 + 7x^2 - x - 7 < 0$

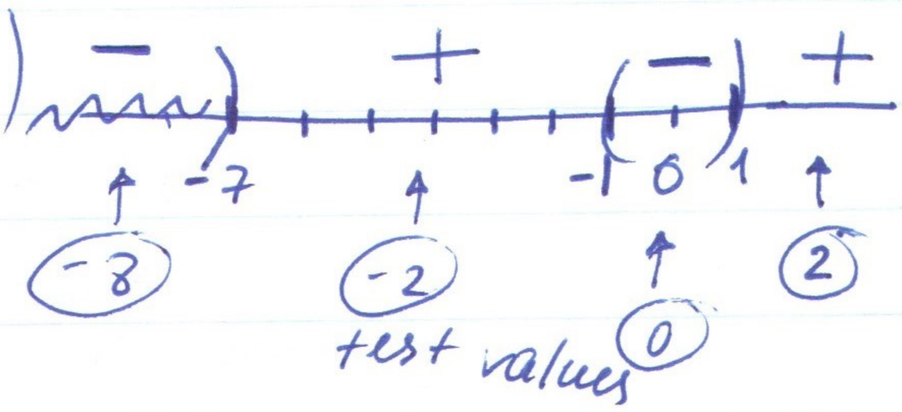
a) $x^2(x+7) - (x+7) = 0$

$(x^2-1)(x+7) = 0$

$(x-1)(x+1)(x+7) = 0$

$x = -1, -7, 1$

b)



d) $f(0) = -7 < 0$ $\quad f(2) = 8 + 28 - 2 - 7 > 0$

$f(-2) = -8 + 28 + 2 - 7 > 0$

$f(-8) = -512 + 448 + 8 - 7 = -63 < 0$

e) exclude baundary points.

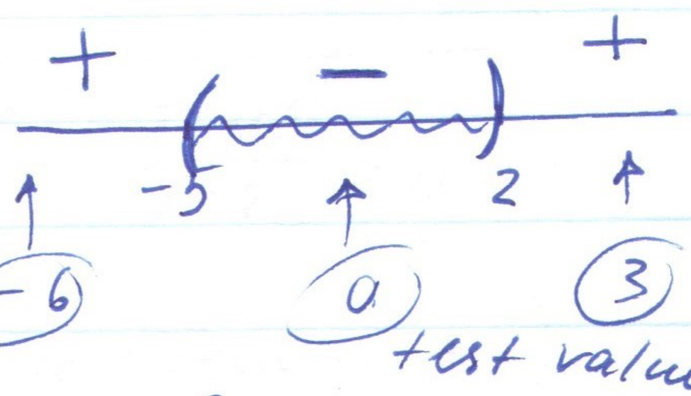
Answer: $\boxed{(-\infty, -7) \cup (-1, 1) \text{ or } \{x \mid x < -7 \text{ or } -1 < x < 1\}}$

#44 $\dfrac{x+5}{x-2} > 0$

a) $x + 5 = 0 \quad x = -5$

$x - 2 = 0 \quad x = 2 \leftarrow$ exclude

b)



c) $f(0) = \dfrac{5}{-2} < 0$

$f(-6) = \dfrac{-1}{-8} = \dfrac{1}{8} > 0 \qquad f(3) = \dfrac{8}{1} > 0$

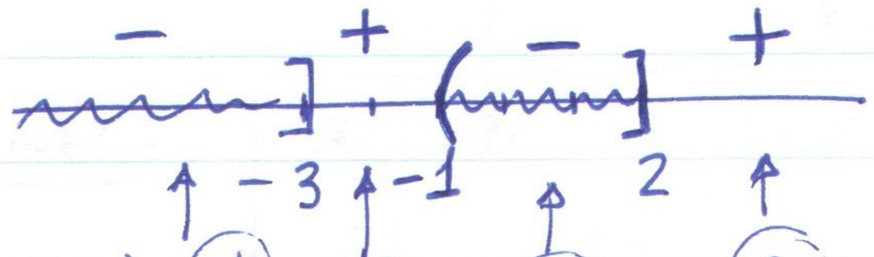
d) all boundary points should be excluded

Answer: $\boxed{(-\infty, -5) \cup (2, \infty) \text{ or } \{x \mid x < -5 \text{ or } x > 2\}}$

$(-\infty, -5) \cup (2, \infty)$

#54 $\dfrac{(x+3)(x-2)}{x+1} \le 0$

a) $x+3=0$ $\quad x=-3$ $\qquad x-2=0$ $\quad x=2$ $\qquad x+1=0$ $\quad x=-1$ ← exclude

b) 

test values

c) $f(0)=\dfrac{3\cdot(-2)}{1}<0$ $\qquad f(3)=\dfrac{6\cdot 1}{4}>0$

$f(-2)=\dfrac{1\cdot(-4)}{-1}>0$ $\qquad f(-4)=\dfrac{-1\cdot(-6)}{-3}<0$

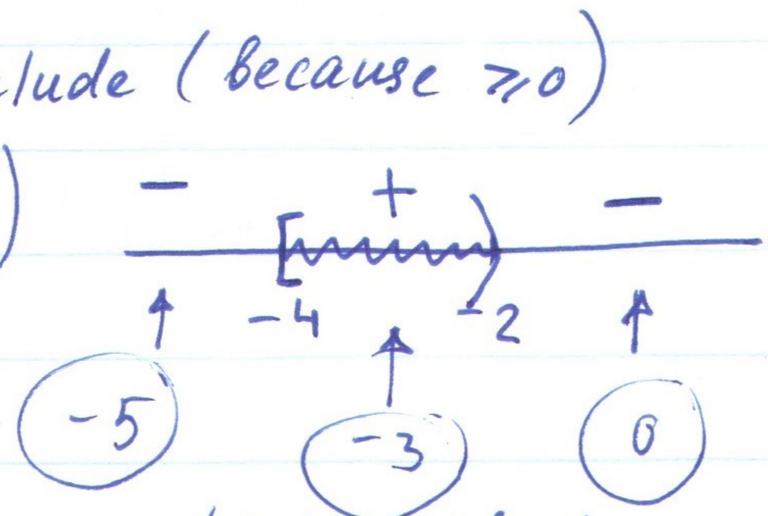
d) answer: $(-\infty,-3]\cup(-1,2]$ or $\{x \mid x\le -3 \text{ or } -1<x\le 2\}$

#60 $\dfrac{x}{x+2}\ge 2$ $\qquad \dfrac{x}{x+2}-2\ge 0$ $\qquad \dfrac{x}{x+2}-\dfrac{2(x+2)}{x+2}\ge 0$

$\dfrac{-x-4}{x+2}\ge 0$ ← include (because ≥ 0)

a) $-x-4=0$ $\quad x=-4$

$x+2=0$ $\quad x=-2$ ← exclude

b) 

test values.

c) $f(0)=\dfrac{-4}{2}<0$

$f(-5)=\dfrac{1}{-3}<0$ $\qquad f(-3)=\dfrac{-1}{-2}>0$

Answer: $[-4,-2)$ or $\{x \mid -4\le x<-2\}$