Solutions to Math 1013 T11 Appendix A

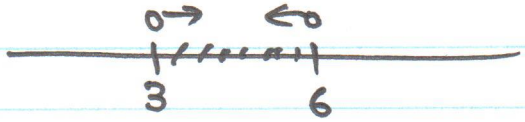
1(a) $-1 < 2x-5 < 7$

$\Rightarrow 2x-5 > 1$ and $2x-5 < 7$

$\Rightarrow x > 3$ and $x < 6$

$\Rightarrow 3 < x < 6$

Solutions $= (3,6)$



(b) $-5 \le 3-2x \le 9$

$\Rightarrow -5-3 \le -2x \le 9-3$

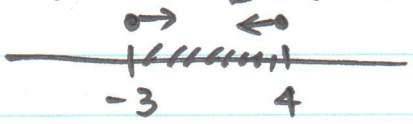
$\Rightarrow -8 \le -2x \le 6$

$\Rightarrow 8 \ge 2x \ge -6$

$\Rightarrow -6 \le 2x \le 8$

$\Rightarrow -3 \le x \le 4$

Solutions $= [-3,4]$



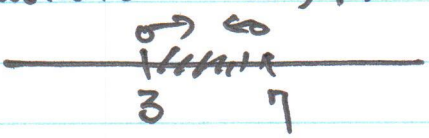
(c) $2x-3 < x+4 < 3x-2$

$\Rightarrow 2x-3 < x+4$ and $x+4 < 3x-2$

$\Rightarrow x < 7$ and $6 < 2x$

$\Rightarrow x < 7$ and $x > 3$

Solutions $= (3,7)$



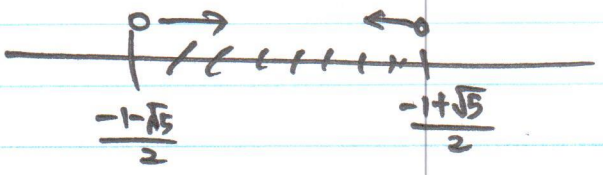
(d) $x^2 + x > 1$

$\Rightarrow x^2 + x - 1 > 0$

$\Rightarrow \left(x - \left(\frac{-1+\sqrt{5}}{2}\right)\right)\left(x - \left(\frac{-1-\sqrt{5}}{2}\right)\right) > 0$

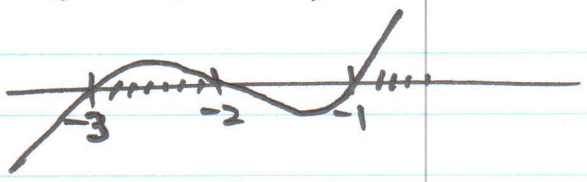
$\Rightarrow x < \frac{-1-\sqrt{5}}{2}$ or $x > \frac{-1+\sqrt{5}}{2}$

Solutions $S = \left(\frac{-1-\sqrt{5}}{2}, \frac{-1+\sqrt{5}}{2}\right)$

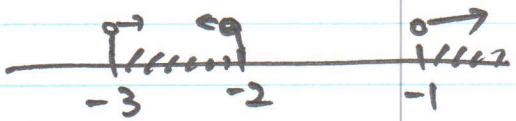


(e) $(x+1)(x+2)(x+3) \ge 0$

$\Rightarrow (x-(-3))(x-(-2))(x-(-1)) \ge 0$



Solution set $= (-3,-2) \cup (-1,\infty)$



(f) $-3 < \frac{1}{x} \le 1$, $x \ne 0$

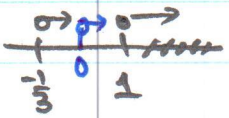
① For $x > 0$

$-3 < \frac{1}{x}$ and $\frac{1}{x} \le 1$

$\Rightarrow -3x < 1$ and $x \ge 1$

$\Rightarrow x > \frac{-1}{3}$ and $x \ge 1$

$\Rightarrow x \ge 1$

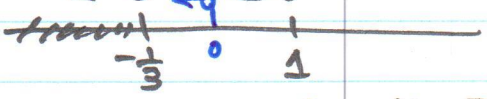


② For $x < 0$

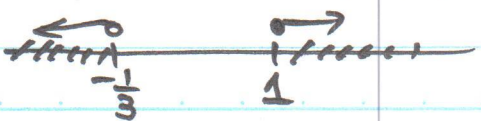
$-3 < \frac{1}{x}$ and $\frac{1}{x} \le 1$

$-3x > 1$ and $1 \ge x$

$x < \frac{-1}{3}$ and $x \le 1$



∴ The solution set $= (-\infty, \frac{-1}{3}) \cup [1,\infty)$



Solutions to Math 1013 (T11) Appendix A

2 (a) $|3x+5|=1$

$\Rightarrow 3x+5=1$ or $3x+5=-1$

$\Rightarrow x=\frac{-4}{3}$ or $x=-2$ #

2(b) $\left|\frac{2x-1}{x+1}\right|=3$

$\Rightarrow \frac{2x-1}{x+1}=3$ or $\frac{2x-1}{x+1}=-3$

$\Rightarrow 2x-1=3x+3$ or $2x-1=-3x-3$

$\Rightarrow -4=x$ or $5x=-2$

$\Rightarrow x=-\frac{2}{5}$ or $x=-4$ #

3(a) $|x+5|\geq 2$

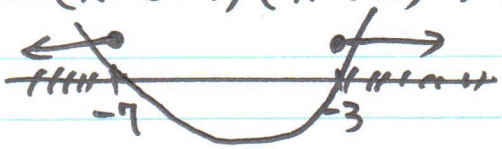
$\Rightarrow |x+5|^2\geq 2^2$

$\Rightarrow (x+5)^2-2^2\geq 0$

$\Rightarrow (x+5+2)(x+5-2)\geq 0$

$\Rightarrow (x+3)(x+7)\geq 0$

$\Rightarrow (x-(-7))(x-(-3))\geq 0$



The solution set $=(-\infty,-7)\cup(-3,\infty)$ #

3(b) $|5x-2|<6$

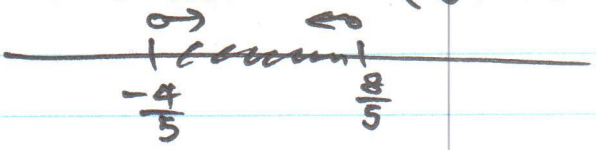
$\Rightarrow -6<5x-2<6$

$\Rightarrow -6+2<5x<6+2$

$\Rightarrow -4<5x<8$

$\Rightarrow \frac{-4}{5}<x<\frac{8}{5}$

The solution Set $=\left(\frac{-4}{5},\frac{8}{5}\right)$



(3) $0<|x-5|<\frac{1}{2}$

$\Rightarrow 0<|x-5|$ and $|x-5|<\frac{1}{2}$

For $0<|x-5| \Rightarrow x\neq 5$

$\Rightarrow x\in \mathbb{R}\setminus\{5\}$

For $|x-5|<\frac{1}{2}$

$\Rightarrow -\frac{1}{2}<x-5<\frac{1}{2}$

$\Rightarrow -\frac{1}{2}+5<x<\frac{1}{2}+5$

$\Rightarrow \frac{9}{2}<x<\frac{11}{2}$

The solution set $=\left(\frac{9}{2},5\right)\cup\left(5,\frac{11}{2}\right)$