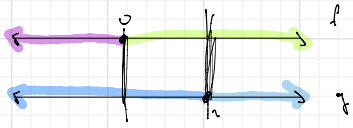
Agenda for Math 005.003 (6 April 2020, 11-11:50 am):

1. (≈5 min) Greetings and administrativa.
2. (≈40 min) Work on WS 2 (syllabus page 236).
3. (≈5 min) Dismissal.



$f(x) = \begin{cases} \dots & \text{if } \dots \\ \dots & \text{if } \dots \\ \dots & \text{if } \dots \end{cases}$

Ex) $f(x) = |x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$

$g(x) = x^2 = \begin{cases} x^2 & \text{if } x \geq 0 \\ x^2 & \text{if } x < 0 \end{cases}$

$$f(x) = \begin{cases} -2x+1 & \text{if } x < 0 \\ 3x+2 & \text{if } 0 \leq x < 2 \\ 3x+2 & \text{if } x \geq 2 \end{cases}$$

$$g(x) = \begin{cases} x+4 & \text{if } x < 0 \\ x+4 & \text{if } 0 \leq x < 2 \\ 2 & \text{if } x \geq 2 \end{cases}$$

$x < 0$: $f(x) = -2x+1 = x+4 = g(x)$

$\Rightarrow 3x = -3$

$\Rightarrow \boxed{x = -1}$ ☺

$0 \leq x < 2$: $f(x) = 3x+2 = x+4 = g(x)$

$\Rightarrow 2x = 2$

$\Rightarrow \boxed{x = 1}$ ☺

$x \geq 2$: $f(x) = 3x+2 = 2 = g(x)$

$\Rightarrow 3x = 0$

$\Rightarrow x = 0$ ✗

The solutions to $f(x) = g(x)$ are $x = -1$ and $x = 1$.

$$f(x) = \begin{cases} -2x+1 & (-\infty, 0) \cap (-\infty, 2) = (-\infty, 0) \\ -2x+1 & (-\infty, 0) \cap [2, \infty) = \emptyset \\ 3x+2 & [0, \infty) \cap (-\infty, 2) = [0, 2) \\ 3x+2 & [0, \infty) \cap [2, \infty) = [2, \infty) \end{cases}$$

↑ intervals on which f is defined

↑ intervals on which g is defined