MATH 2A/5A Prep: Fractions and Linear Equations

1. Simplify the expression $\dfrac{2}{2x+1} - \dfrac{x}{x^2+1}$

Solution:

$$\begin{aligned}\frac{2}{2x+1} - \frac{x}{x^2+1} &= \frac{2(x^2+1)}{(2x+1)(x^2+1)} - \frac{x(2x+1)}{(x^2+1)(2x+1)} \\ &= \frac{2x^2+2-(2x^2+x)}{(x^2+1)(2x+1)} \\ &= \frac{2x^2+2-(2x^2+x)}{(x^2+1)(x+1)} \\ &= \frac{2-x}{(x^2+1)(x+1)}\end{aligned}$$

2. Solve the equation $\dfrac{1-x}{1+x} = 3$.

Solution: The equation can be written as $\dfrac{1-x}{1+x} = \dfrac{3}{1}$. So it is same as

$$\begin{aligned}(1-x)\cdot 1 &= (1+x)\cdot 3 \\ 1-x &= 3+3x \\ 1-3 &= 3x+x \\ -2 &= 4x \\ -\frac{1}{2} &= x\end{aligned}$$

So the solution is $x = -\frac{1}{2}$.

3. In the script we mentioned $\dfrac{1}{a}+\dfrac{1}{b} \neq \dfrac{1}{a+b}$. Find the correct formula of writing $\dfrac{1}{a}+\dfrac{1}{b}$ as a single fraction.

Solution:

$$\begin{aligned}\frac{1}{a}+\frac{1}{b} &= \frac{b}{ab}+\frac{a}{ab} \\ &= \frac{a+b}{ab}\end{aligned}$$

4. Find the equation of the line passing through the point $(-2, 3)$ and is parallel to the line $y = 4x + 5$.

Solution: The given line $y = 4x + 5$ has slope 4, so the line we want to find also has slope $m = 4$. It passes through $(-2, 3)$, so the equation is

$$y - 3 = 4(x + 2)$$

It can also be written as

$$y = 4(x + 2) + 3$$

or

$$y = 4x + 11$$