

MAT 104 Quiz 22

Wednesday, November 3, 2004

1. When a number is added to the numerator and multiplied by the denominator of the fraction $\frac{1}{2}$, the resulting fraction is $\frac{3}{5}$. Find this number.

Let x = our magic number. So our original fraction $\frac{1}{2}$ gets transformed like

$$\frac{1+x}{2x}$$

and this result must be equal to the fraction $\frac{3}{5}$. So

$$\begin{aligned}\frac{1+x}{2x} = \frac{3}{5} &\implies 10x \left(\frac{1+x}{2x} \right) = 10x \left(\frac{3}{5} \right) \\ &\implies 5(1+x) = 2x(3) \\ &\implies 5+5x = 6x \\ &\implies x = 5\end{aligned}$$

2. Brad can grade all of the math placement exams in 2 hours. Mary can grade them in 4 hours. How long would it take for them to grade the exams together?

Brad's rate is $\frac{1}{2}$ of the exams per hour, and Mary's rate is $\frac{1}{4}$ of the exams per hour. Combined their rate is $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$ of the exams per hour. So

$$\begin{aligned}\text{Work} = \text{Rate} \times \text{Time} &\implies 1 \text{ Set} = \frac{3 \text{ Set}}{4 \text{ Hour}} \times \text{Time} \\ &\implies \text{Time} = \frac{4}{3} \text{ Hours}\end{aligned}$$