1. Evaluate $2^x = 20$

Method #1: Log both sides

$\log 2^x = \log 20$

$x \log 2 = \log 20$

$\dfrac{x \log 2}{\log 2} = \dfrac{\log 20}{\log 2}$

$x = \boxed{\dfrac{\log 20}{\log 2}}$ ← *equal!*

$\boxed{x = 4.32}$

Method 2: put in log form

$2^x = 20$

$\Rightarrow \boxed{\log_2 20 = x}$

$\therefore \log_2 20 = \dfrac{\log 20}{\log 2}$

Change of Base Rule: $\log_a b = \dfrac{\log b}{\log a}$ or $\log_a b = \dfrac{\log_c b}{\log_c a}$

2. Solve for x.

a) $\dfrac{2(5)^x}{2} = \dfrac{80}{2}$ *simplify first!* $5^x = 40$

Method 1:

$\log 5^x = \log 40$

$\dfrac{x \log 5}{\log 5} = \dfrac{\log 40}{\log 5}$

$x = \dfrac{\log 40}{\log 5}$

$\boxed{x = 2.29}$

Method 2:

$5^x = 40$

$\Rightarrow \log_5 40 = x$

$x = \dfrac{\log 40}{\log 5}$ *) change of base*

$x = 2.29$

b) $2(3)^x = 5^{x+1}$ *only option is method 1

$\log 2(3)^x = \log 5^{x+1}$

$\log 2 + \log 3^x = (x+1)\log 5$

$\log 2 + x\log 3 = x\log 5 + \log 5$

$x\log 3 - x\log 5 = \log 5 - \log 2$

$$\frac{x \log 3/5}{\log 3/5} = \frac{\log 5/2}{\log 3/5}$$

$$x = \frac{\log 5/2}{\log 3/5} \qquad \boxed{x = -1.79}$$

c) $4^{x-1} = 7^{x+2}$

$\log 4^{x-1} = \log 7^{x+2}$

$(x-1)\log 4 = (x+2)\log 7$

$x\log 4 - \log 4 = x\log 7 + 2\log 7$

$x\log 4 - x\log 7 = 2\log 7 + \log 4$

$x\log \frac{4}{7} = \log 7^2 + \log 4$

$x\log \frac{4}{7} = \log(49 \cdot 4)$

$$\frac{x\log\frac{4}{7}}{\log\frac{4}{7}} = \frac{\log(49\cdot4)}{\log\frac{4}{7}}$$

$$x = \frac{\log 196}{\log \frac{4}{7}}$$

$$\boxed{x = -9.43}$$

p. 451 # 3-5

p. 466 # 6, 7, 10, 12