

Evaluate

$$\log_3 \frac{1}{\sqrt{27}} = X$$

$$3^X = \frac{1}{\sqrt{27}}$$

$$3^X = \frac{1}{(27)^{\frac{1}{2}}}$$

$$3^X = \frac{1}{(3^3)^{\frac{1}{2}}}$$

$$3^X = 3^{-\frac{3}{2}}$$

$$X = -\frac{3}{2}$$

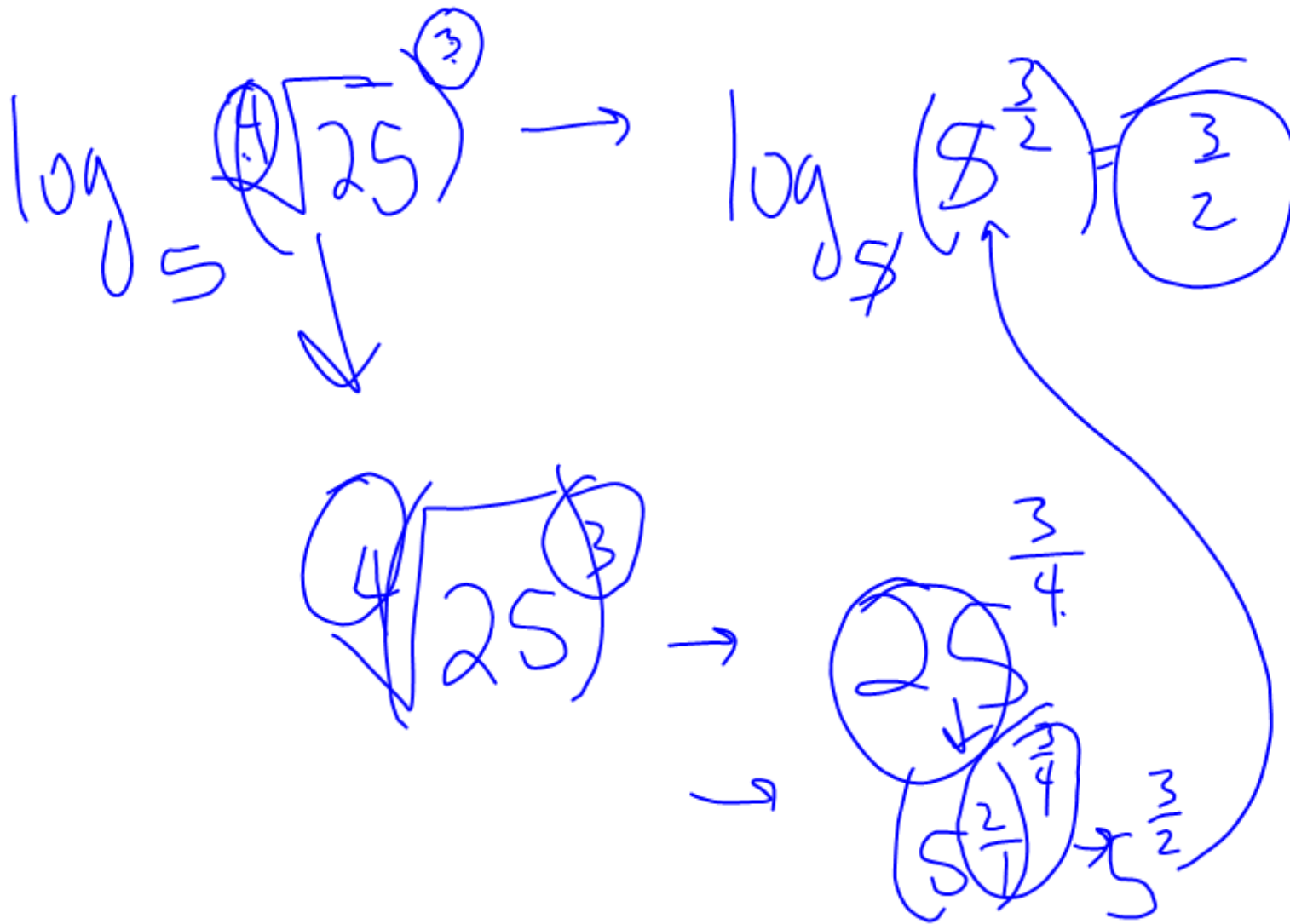
$$\log_3 \left(\frac{1}{\sqrt{27}} \right)$$

$$\log_3 \left(\frac{1}{27^{1/2}} \right)$$

$$\log_3 \left(\frac{1}{3^{3/2}} \right)$$

$$\log_3 \left(3^{-3/2} \right) = -\frac{3}{2}$$

$$\log_3 9$$
$$\log_3 (3^2)$$
$$\textcircled{2}$$



$$\log_4 \sqrt[5]{8} = X$$

$$4^x = \sqrt[5]{8}$$

$$2^{2x} = 8^{1/5}$$

$$2^{2x} = 2^{3/5}$$

$$2^{2x} = 2^{3/5}$$

$$\frac{1}{2} \cdot 2x = \frac{3}{5} \cdot \frac{1}{2}$$

$$X = \frac{3}{10}$$

14.4 (Day 1) Properties

- write as a single log
- Expand
- ① $\log_a (x \cdot y) \Rightarrow \log_a x + \log_a y$
- ② $\log_a \left(\frac{x}{y}\right) \Leftrightarrow \log_a x - \log_a y$
- ③ $\log_a (x^n) \Leftrightarrow n \cdot \log_a x$

Expand

$$\begin{aligned}\log_2(8 \cdot X) &= \log_2 8 + \log_2 X \\ &= 3 + \log_2 X\end{aligned}$$

$$\begin{aligned}\log_5(125 \cdot X \cdot Y) &= \log_5 125 + \log_5 X + \log_5 Y \\ &= 3 + \log_5 X + \log_5 Y\end{aligned}$$

Write as a single log

$$\log_2 x + \log_2 y = \log_2(xy)$$

$$\log_3 X \text{ } \textcircled{+} \text{ } \log_3 X$$

and



write as a single log

$$\textcircled{2} \log_3 X$$

Expanded

same

$$\log_3 (X \cdot X)$$

$\log_3 X$ $\textcircled{2}$

Expand

$$\log_5 \left(\frac{25x^2}{y^3} \right) \rightarrow \log_5(25x^2) - \log_5(y^3)$$

$$\rightarrow \log_5 25 + \log_5 x^2 - \log_5 y^3$$

$$\rightarrow 2 + 2\log_5 x - 3\log_5 y$$

$$\log_3 \frac{\sqrt{x}}{y^2} = \log_3 x^{\frac{1}{2}} - \log_3 y^2$$

$$\underline{\underline{= \frac{1}{2} \log_3 x - 2 \log_3 y}}$$

Expand completely

$$\log_6 \left(\frac{\sqrt[3]{x}}{36y^4} \right) \textcircled{1}$$

$$\log_6 (x^{\frac{1}{3}}) - \left[\log_6 (36y^4) \right]$$

$$+ \log_6 (x^{\frac{1}{3}}) + (-\log_6 36 + \log_6 y^4)$$

$$\frac{1}{3} \log_6 x - 2 - 4 \log_6 y$$

Expand

$$\log_2(X^3 y^5) = \log_2 X^3 + \log_2 y^5$$

$$= 3\log_2 X + 5\log_2 y$$



write as a single log

$$3\log_2 X + 5\log_2 y$$

$$1\log_2 X^3 + 1\log_2 y^5 \rightarrow \log_2(X^3 y^5)$$

write as a single log

$$\frac{1}{2} \log_s X - 2 \log_s y$$

$$1 \log_s \sqrt{X} - 1 \log_s y^2$$

$$\log_s \left(\frac{\sqrt{X}}{y^2} \right)$$

$$\log_2 (X-3)$$

