Sec 3.5 Notes

#1-4
- Isolate Base & exp.
- Get same Base on both sides
- set exp = to each other

1) $2^{3x-5} = 32$

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

$3x-5 = 5$

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

2) $3^{2x-5} - 243 = 0$

$3^{2x-5} = 243$

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

$2x-5 = 5$

$x = 5$

3) $\frac{2^{4x}}{4} \cdot 4 = 64 \cdot 4$

$2^{4x} = 256$

$2^{4x} = 2^8$

$4x = 8$

$x = 2$

4) $\frac{9^x}{3} \cdot 3 = 9 \cdot 3$

$9^x = 27$

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

$2x = 3$

$x = \frac{3}{2}$

Practice CW ODDS

1) $36\left(\frac{1}{3}\right)^{x/5} = 4$

$\left(\frac{1}{3}\right)^{x/5} = \frac{1}{9}$

$\left(\frac{1}{3}\right)^{x/5} = \left(\frac{1}{3}\right)^2$

$\frac{x}{5} = 2$

$\boxed{x = 10}$

3) $\frac{2 \cdot 5^{x/4}}{2} = \frac{250}{2}$

$5^{x/4} = 125$

$5^{x/4} = 5^3$

$\frac{x}{4} = 3$

$\boxed{x = 12}$

5) $\frac{2\left(10^{-x/3}\right)}{2} = \frac{20}{2}$

$10^{-x/3} = 10^1$

$-\frac{x}{3} = 1$

$\boxed{x = -3}$

7) $\log x = 4$

$10^4 = x$

$\boxed{10{,}000 = x}$

9) $\log_4 (x-5) = -1$

$4^{-1} = x - 5$

$\frac{1}{4} = x - 5$

$\frac{20}{4} + 5$

$\boxed{\frac{21}{4} = x}$

11) $1.06^x = 4.1$

$\ln 1.06^x = \ln 4.1$

$\frac{x \ln 1.06}{\ln 1.06} = \frac{\ln(4.1)}{\ln(1.06)}$

$\boxed{x = 24.2151}$

13) $\frac{50e^{0.035x}}{50} = \frac{200}{50}$

$e^{0.035x} = 4$

$\ln e^{0.035x} = \ln 4$

$0.035x \underbrace{\ln e}_{=1} = \ln 4$

$0.035x = \frac{\ln(4)}{0.035}$

$\boxed{x = 39.6084}$

15) $3 + 2e^{-x} = 6$

$2e^{-x} = 3$

$e^{-x} = \frac{3}{2}$

$\ln e^{-x} = \ln \frac{3}{2}$

$-x \ln e = \ln \frac{3}{2}$

$-x = \ln \frac{3}{2}$

$x = -\ln \frac{3}{2}$

$\boxed{x = -0.4055}$

17) $3\ln(x-3) + 4 = 5$

$3\ln(x-3) = 1$

$\ln(x-3) = \frac{1}{3}$

$e^{1/3} = x - 3$

$e^{(1/3)} + 3 = x$

$\boxed{4.3956 = x}$

35) $\frac{1}{2}\ln(x+3) - \ln x = 0$

condense

$$\ln \frac{(x+3)^{1/2}}{x} = 0$$

$$e^0 = \frac{(x+3)^{1/2}}{x}$$

$$1 = \frac{\sqrt{x+3}}{x}$$

$$x^2 = \sqrt{x+3}^{\,2}$$

$$x^2 = x+3$$

$$x^2 - x - 3 = 0$$

use QF

$$x = \frac{1 \pm \sqrt{(-1)^2 - 4(1)(-3)}}{2(1)}$$

$$\frac{1+\sqrt{13}}{2} = \boxed{2.3028}$$

$$\frac{1-\sqrt{13}}{2} = -1.3028$$

37)

$$\ln(x-3) + \ln(x+4) = 3\ln 2$$

$$\ln \underbrace{(x-3)(x+4)}_{\text{foil}} = \ln 2^3$$

$$x^2 + x - 12 = 8$$

$$x^2 + x - 20 = 0$$

$$(x+5)(x-4) = 0$$

$x = -5$ $\quad \boxed{x = 4}$