4.5 #1-25 odd; solving exponential equations;
#27-47 odd solving logarithmic equations

4.6 #5,7,9,15,17 application problems

12. $28^x = 10^{-3x}$

$\log 28^x = \log 10^{-3x}$

$x \log 28 = -3x$

$x \log 28 + 3x = 0$

$x(\log 28 + 3) = 0$

$x = 0$

$\log_a b^p = p \log_a b$

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

20. $5^{x+2} = 4^{1-x}$

$\ln(5^{x+2}) = \ln(4^{1-x})$

$(x+2)\ln 5 = (1-x)\ln 4$

$x\ln 5 + 2\ln 5 = \ln 4 - x\ln 4$

$x\ln 5 + x\ln 4 = \ln 4 - 2\ln 5$

$x(\ln 5 + \ln 4) = \ln 4 - 2\ln 5$

$x = \dfrac{\ln 4 - 2\ln 5}{\ln 5 + \ln 4} = \dfrac{\ln\left(\frac{4}{25}\right)}{\ln(5\cdot 4)} = \dfrac{\ln\frac{4}{25}}{\ln 20}$

$= \log_{20}\left(\frac{4}{25}\right)$

24. $e^x - 6e^{-x} = 1$

$x^{-n} = \dfrac{1}{x^n}$

$a^n a^m = a^{n+m}$

$(a^m)^n = a^{mn}$

$e^x\left(e^x - \frac{6}{e^x}\right) = 1\cdot e^x$

$e^x e^x - \frac{e^x}{1}\cdot\frac{6}{e^x} = e^x$

e^{x+x}

$e^{2x} - 6 = e^x$

$e^{2x} - e^x - 6 = 0$

$(e^x)^2$

Let $u = e^x$

$u^2 - u - 6 = 0$

$(u-3)(u+2) = 0$

$u = 3, u = -2$

$e^x = 3$; $e^x = -2$

$\ln e^x = \ln 3$ $\ln e^x = \ln(-2)$

$x = \ln 3$ ~~$x = \ln(-2)$~~

24. $e^x - 6e^{-x} = 1$

$e^x(e^x - 6e^{-x}) = 1 \cdot e^x$

$e^{x+x} - 6e^{x+(-x)} = e^x$

$e^{2x} - 6e^0 = e^x$

$e^{2x} - 6 = e^x$

26. $\frac{5^x - 5^{-x}}{5^x + 5^{-x}} = 8$

$5^x - 5^{-x} = 8(5^x + 5^{-x})$

$5^x - 5^{-x} = 8(5^x) + 8(5^{-x})$

$x - y = 8x + 8y$

$5^x \cdot 0 = (7(5^x) + 9(5^{-x})) \cdot 5^x$

$0 = 7 \cdot 5^x 5^x + 9 \cdot 5^{-x} 5^x$

$0 = 7 \cdot 5^{x+x} + 9 \cdot 5^{-x+x}$

$0 = 7 \cdot 5^{2x} + 9 \cdot 5^0$

$0 = 7(5^{2x}) + 9$

$-9 \quad -9$

$-9 = 7(5^{2x})$

$\frac{-9}{7} = 5^{2x}$

$\ln\left(\frac{-9}{7}\right) = \ln(5^{2x})$

$\ln\left(\frac{-9}{7}\right) = 2x \ln 5$

$\frac{\ln\left(\frac{-9}{7}\right)}{2 \ln 5} = x$

no solution

34. $\log_5(8-7x)=3$

$5^{\log_5(8-7x)}=5^3$

$8-7x=125$

$-7x=117$

$x=-117/7$

38. $\log(x+5)-\log(x-3)=\log 2$

$10^{\log_{10}\frac{x+5}{x-3}}=10^{\log_{10}2}$

$\frac{x+5}{x-3}=2$

$x+5=2(x-3)$

$x+5=2x-6$

$11=x$