Logs/Expo Test

8) $\dfrac{\log_{10}(x^7) - \log_{10}(x^{10})}{\log_{10}(5x^2) + \log_{10}(2x^4)} \rightarrow \dfrac{\log_{10} 1/x^3 = -\log_{10} x^3}{\log_{10}(5) + 2\log_{10}(x) + 4\log_{10}(x) + \log_{10}(2) - 1}$

$\log_{10}(5) + \log_{10}(2) = 1 \quad + 6\log_{10} x - 1$

$= 6\log_{10} x \rightarrow \dfrac{-3\log_{10} x}{6\log_{10} x} = \boxed{-1/2}$

Simplify Denominator

$\log_{10}(5x^2) = \log_{10}(5) + 2\log_{10}(x)$

$\log_{10}(2x^4) = 4\log_{10}(x) + \log_{10}(2)$

$3^x = -4$

$\emptyset$

3^x cannot be negative

$3^x = 1/3$

$\boxed{x = -1}$

9) $3^{2x+1} + 11 \cdot 3^x - 4 = 0$

$3^{2x} \cdot 3^1 + 11 \cdot 3^x - 4 = 0$

$3^x = y \quad 3y^2 + 11y - 4 = 0$

$\dfrac{-11 \pm \sqrt{121+48}}{6} \quad \dfrac{-11 \pm \sqrt{169}}{6} = \dfrac{-11 \pm 13}{6} = \dfrac{-24}{6} \text{ or } \dfrac{2}{6}$

$y = -4$ or $1/3$

10) $\log_x(6-x) = 2$

$x^2 = 6 - x \rightarrow x^2 + x - 6 = 0$

$\dfrac{-1 \pm \sqrt{1+24}}{2} \quad \dfrac{-1 \pm 5}{2} = \dfrac{4}{2} \text{ or } \dfrac{-6}{2}$

$x = 2, -3$, but the base is not < 0 or 1. $\boxed{x = 2}$