Algebra Practice Problems (Set 2)

First, a couple of examples where we "solve for x":

- Solve $\left(\frac{1}{3}\right)^x = 81$

  SOLUTION: By making a common base between the left and right sides of the equation, we can equate the exponents. It looks like we can write both as powers of 3:

  $$\left(\frac{1}{3}\right)^x = 3^{-x}$$

  And on the other side:

  $$81 = 9^2 = 3^4$$

  Now we can rewrite the equation as: $3^{-x} = 3^4$, so that $x = -4$.

- Solve for b, if $81 = b^{4/3}$.

  SOLUTION:

  $$\begin{aligned} 81 &= b^{4/3} \\ 81^{3/4} &= b^1 \\ \left(3^4\right)^{3/4} &= b \\ 3^3 &= b \\ 27 &= b \end{aligned}$$

1. See if you can use these example (and the rules of exponents) to solve for x in each of the following:

   (a) $4^x = 2$

   (b) $\left(\frac{2}{3}\right)^x = \frac{9}{4}$

   (c) $5^{2p+1} = 25$

   (d) $32^x = 16^{1-x}$

   (e) $\left(\frac{1}{8}\right)^{-2p} = 2^{p+3}$

2. Use the rules of exponents (and fractions) to simplify as much as possible (all exponents should be positive):

   (a) $\frac{5x^2y}{x+y} \div \frac{30xy^2}{3x+3y}$

   (b) $\frac{y^{5/3}y^{-2}}{y^{-5/6}}$

   (c) $\frac{\frac{1}{p}+\frac{1}{q}}{1-\frac{1}{pq}}$

   (d) $\frac{k^2+k}{8k^3} \cdot \frac{4}{k^2-1}$

   (e) $\frac{1}{4y} + \frac{8}{5y}$