**Problem 1 (3 points):** *Use the properties of exponents to rewrite the given expression as a simple fraction with only positive exponents*

$$\left(\frac{x^3y^{10}}{x^2y^{12}}\right)^3$$

**Solution:** Using the rule that $\dfrac{a^m}{a^n} = a^{m-n} = \dfrac{1}{a^{n-m}}$ we can simplify to

$$\left(\frac{x}{y^2}\right)^3$$

Finally, distributing the power to each term and applying the rule that $(a^m)^n = a^{mn}$ we obtain

$$\frac{x^3}{y^6}$$

**Problem 2 (3 points):** *Rewrite the following expression using fractional exponents and simplify.*

$$\sqrt{\frac{x^3y^6}{4}}$$

**Solution:** Using the rule that $a^{1/2} = \sqrt{a}$ we have

$$\sqrt{\frac{x^3y^6}{4}} = \left(\frac{x^3y^6}{4}\right)^{1/2}$$

Finally, distributing the power to each term, we simplify to

$$\frac{x^{3/2}y^2}{2}$$

**Problem 3 (3 points):** *Factor the following polynomial*

$$2x^2 + x - 6$$

**Solution:** Using the method outlined in lecture for factoring $ax^2 + bx + c$ we note that $ac = (2)(-6) = -12$. Searching for factors of $-12$ that sum to one, we note that $-3$ and 4 have the property that $(-3)(4) = -12$ and $-3 + 4 = 1$. Therefore we split the polynomial up as $2x^2 + 4x - 3x - 6$ and then factor by grouping.

$$\begin{aligned} 2x^2 + 4x - 3x - 6 &= 2x(x+2) - 3(x+2) \\ &= (x+2)(2x-3) \end{aligned}$$

**Problem 4 (1 point):** *Saying that* $(a^{-1}b^{-1})^{-1} = ab$ *is (circle one:)*

*CORRECT* *A VITAL ERROR*

**Solution:** The above operation is **CORRECT**. It is perfectly legal to distribute powers across a product as we have done above. Remember, distributing powers across a sum or difference is a vital error but distributing powers across a product or quotient is correct.