

For each problem, show your work.

1. **(5 points)** Answer the following questions about exponents:

(a) **(3 points)** Simplify the expression $\frac{(x^2y)^3}{y^2}$.

(b) **(2 points)** Determine the value (writing as an integer or a fraction as appropriate) of $9^{-3/2}$.

2. **(8 points)** Simplify the following rational expressions:

(a) **(4 points)** $\frac{x+3}{\frac{2x^2-17x}{4x-2}}$.

(b) **(4 points)** $(x^2 - 2) - \frac{x+1}{x-1}$.

3. **(7 points)** A boat is traveling on a river with a current of 3 miles per hour; thus, when going upstream, the boat travels 3 mph slower than its speed in still water and when going downstream it travels 3 mph faster. This boat goes 4 miles up the river and then 4 miles back down to its starting point in a total of one hour. How fast is the boat in still water?