1. (4 points each) Simplify

a) $\sqrt{288} - \sqrt{200}$

Answer. Start with the first term, and factor the number inside. $288 = 32 \cdot 9 = 2^5 3^2$. Therefore this first term is

$$\sqrt{2^5 3^2} = \sqrt{2^4}\sqrt{2}\sqrt{3^2} = 2^2 3\sqrt{2} = 12\sqrt{2}.$$

Now do the same with the second term: $200 = 8 \cdot 25 = 2^3 5^2$. So this term simplifies as

$$\sqrt{2^3 5^2} = \sqrt{2^2}\sqrt{2}\sqrt{5^2} = 10\sqrt{2}.$$

Putting this all together, we have

$$12\sqrt{2} - 10\sqrt{2} = (12 - 10)\sqrt{2} = 2\sqrt{2}.$$

□

b) $\sqrt[3]{\dfrac{81x^{-2}y^6 z^{16}}{3x^{-5}y^{-3}}}$

Answer. Work piece by piece. First, try to simplify all the numbers, then all the x's, and so on. $81/3 = 27$, $x^{-2}/x^{-5} = x^{-2-(-5)} = x^3$, and $y^6/y^{-3} = y^9$. So our expression simplifies to

$$\sqrt[3]{27x^3 y^9 z^16} = \sqrt[3]{3^3}\sqrt[3]{x^3}\sqrt[3]{y^9}\sqrt[3]{z^{16}}$$
$$= 3xy^3\sqrt[3]{z^15}\sqrt[3]{z}$$
$$= 3xy^3 z^5 \sqrt[3]{z}$$

□

2. True or False?

a) $x = -1$ is a solution to the equation

$$\frac{x+3}{x+1} - \frac{2}{x+1} = 0$$

b) $\sqrt{x^2} = -x$ when $x < 0$.

Answer. a) False, $x = -1$ would make the bottom equal zero, which we cannot let happen.

b) True! When the inside is negative, the absolute value bars add a factor of (-1).

$\square$