Laws of Exponents:

$$a^0 = 1, \quad a^{-n} = \frac{1}{a^n}$$

① $a^m \, a^n = a^{m+n}$ ← to multiply powers of like bases, add exponents

② $\dfrac{a^m}{a^n} = a^{m-n}$ ← to divide powers of like bases, subtract

③ $(a^m)^n = a^{mn}$ ← to raise a power to a power, multiply

④ $(ab)^n = a^n b^n$ ← raise each factor to the power

⑤ $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}$ ← raise top and bottom to power

} distribute the exponent!

⑥ $\left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n$ ← to raise a number to a negative power, invert and change the sign of the power

⑦ $\dfrac{a^{-n}}{b^{-m}} = \dfrac{b^m}{a^n}$ ←

Properties of nth roots:

① $\sqrt[n]{ab} = \sqrt[n]{a}\,\sqrt[n]{b}$

② $\sqrt[n]{\dfrac{a}{b}} = \dfrac{\sqrt[n]{a}}{\sqrt[n]{b}}$

③ $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

④ $\sqrt[n]{a^n} = a$ if n is odd

⑤ $\sqrt[n]{a^n} = |a|$ if n is even

Simplify Each Expression

a) $x^8 x^2$

b) $x^2 x^{-6}$

c) $\left(\dfrac{x^4 z^2}{4 y^5}\right)\left(\dfrac{2 x^3 y^2}{z^3}\right)^2$

d) $\left(\dfrac{y}{5 x^{-2}}\right)^{-3}$

e) $\dfrac{s^{3/2}}{s^{1/2}}$