In the following, assume that all variables are positive numbers.

1. Simplify. Give the answer in radical notation:

$$\sqrt[12]{x^4 y^8} = \left(x^4 y^8\right)^{\frac{1}{12}} = x^{\frac{4}{12}} y^{\frac{8}{12}} = x^{\frac{1}{3}} y^{\frac{2}{3}} = \sqrt[3]{x y^2}$$

2. Simplify and write the answer in radical notation:

$$\sqrt[5]{x^3} \cdot \sqrt[8]{x} = x^{\frac{3}{5}} \cdot x^{\frac{1}{8}} = x^{\frac{3}{5}+\frac{1}{8}} = x^{\frac{3 \cdot 8}{5 \cdot 8}+\frac{1 \cdot 5}{8 \cdot 5}} = x^{\frac{24}{40}+\frac{5}{40}} = x^{\frac{29}{40}} = \sqrt[40]{x^{29}}$$

3. Write in radical notation: $a^{-\frac{5}{6}} = \dfrac{1}{a^{\frac{5}{6}}} = \dfrac{1}{\sqrt[6]{a^5}}$

4. Simplify: $\sqrt[3]{750} = \sqrt[3]{125 \cdot 6} = 5\sqrt[3]{6}$

5. Simplify: $\sqrt{2xy^5} \cdot \sqrt{50x^3 y^9} = \sqrt{100 x^4 y^{14}} = 10 x^2 y^7$

6. Simplify: $\sqrt{363 x^7 y^{10} z^5} = \sqrt{121 \cdot 3 \cdot x^6 \cdot x \cdot y^{10} \cdot z^4 \cdot z} = 11 x^3 y^5 z^2 \sqrt{3 x z}$

7. Simplify: $\sqrt[4]{14 x^5 y^{13}} \cdot \sqrt[4]{8 x^5 y^{10}} = \sqrt[4]{112 \, x^{10} y^{23}} = \sqrt[4]{16 \cdot 7 \cdot x^8 \cdot x^2 \cdot y^{20} \cdot y^3} = 2 x^2 y^5 \sqrt[4]{7 x^2 y^3}$