

Warm-up - Quiz next class on 5.4/5.5

① Simplify a) $(\sqrt{15} - \sqrt{5})^2$

$$= (\sqrt{15} - \sqrt{5})(\sqrt{15} - \sqrt{5})$$

$$= 15 + 5 - \sqrt{75} - \sqrt{75}$$

$$= 20 - 2 \cdot \sqrt{75} = \boxed{20 - 10\sqrt{3}}$$

$$\begin{array}{c} \uparrow \\ 3 \cdot 25 \\ \textcircled{55} \end{array}$$

b) $\frac{\sqrt[3]{x^2}}{\sqrt[4]{x^9}} = \frac{x^{2/3}}{x^{9/4}}$

$$= x^{2/3 - 9/4} = x^{8/12 - 27/12} = x^{-19/12}$$

$$= \frac{1}{x^{19/12}} = \frac{1}{\sqrt[12]{x^{19}}} = \boxed{\frac{1}{x^{12}\sqrt{x^7}}}$$

② Rationalize the denominator

a) $\sqrt[4]{\frac{x^3}{5}}$

$$\frac{\sqrt[4]{x^3}}{\sqrt[4]{5}}$$

$$\cdot \frac{\sqrt[4]{5^2}}{\sqrt[4]{5^2}}$$

$$\boxed{\frac{\sqrt[4]{5^3 x^3}}{5}}$$

b) $\frac{\sqrt{3}-2}{-\sqrt{5}-7} \cdot \frac{-\sqrt{5}+7}{-\sqrt{5}+7}$

conjugate

$$= \frac{(\sqrt{3}-2)(-\sqrt{5}+7)}{(-\sqrt{5}-7)(-\sqrt{5}+7)}$$

$$= \frac{-\sqrt{45} + 2\sqrt{15} - 14 + 7\sqrt{3}}{15 - 49 + 2\sqrt{15} - 2\sqrt{15}}$$

$$= \boxed{\frac{3\sqrt{5} - 2\sqrt{15} + 14 - 7\sqrt{3}}{34}}$$

③ Solve $2x = 3\sqrt{x-1} + 1$
and check answers

$$(2x-1)^2 = (3\sqrt{x-1})^2$$

$$(2x-1)(2x-1) = (3\sqrt{x-1})(3\sqrt{x-1})$$

$$\begin{aligned}\sqrt{3} \cdot \sqrt{3} &= 3 \\ \sqrt{x-1} \cdot \sqrt{x-1} &= x-1\end{aligned}$$

$$4x^2 - 4x + 1 = 9(x-1)$$

$$4x^2 - 4x + 1 = 9x - 9$$

$$4x^2 - 13x + 10 = 0$$

$$x = \frac{-(-13) \pm \sqrt{(-13)^2 - 4(4)(10)}}{2(4)}$$

$$x = \frac{13 \pm \sqrt{169 - 160}}{8} = \frac{13 \pm 3}{8} = 2, \frac{5}{4}$$

Check $x=2$

$$2(2) = 3\sqrt{2-1} + 1$$

$$4 = 3\sqrt{1} + 1$$

$$4 = 3 + 1 \checkmark$$

Check $x = \frac{5}{4}$

$$2\left(\frac{5}{4}\right) = 3\sqrt{\frac{5}{4}-1} + 1$$

$$\frac{5}{2} = 3\sqrt{\frac{1}{4}} + 1$$

$$\frac{5}{2} = 3 \cdot \frac{1}{2} + 1$$

$$\frac{5}{2} = \frac{3}{2} + 1 \checkmark$$

