

Warm-up - Quiz next class on 5.4/5.5

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

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

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

$$= 15 - 2\sqrt{75} + 5$$

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

$$\begin{array}{c} \wedge \\ 5 \quad 15 \\ \wedge \\ 3 \quad 5 \end{array}$$

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

$$= x^{\frac{2}{3} - \frac{9}{4}} = x^{\frac{8}{12} - \frac{27}{12}}$$

$$= x^{-\frac{19}{12}} = \sqrt[12]{x^{-19}}$$

$$= \sqrt[12]{\frac{1}{x^{19}}} = \boxed{\frac{1}{x^{19}\sqrt[12]{x^3}}}$$

$$x^{-n} = \frac{1}{x^n}$$

② Rationalize the denominator

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

$$\frac{\sqrt[4]{x^3}}{\sqrt[4]{5}} \cdot \frac{\sqrt[4]{5}}{\sqrt[4]{5}} = \frac{\sqrt[4]{5x^3}}{\sqrt[4]{5^2}} \cdot \frac{\sqrt[4]{5^2}}{\sqrt[4]{5^2}}$$

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

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

conjugate

$$(-\sqrt{5}+7)(-\sqrt{5}+7)$$

$$15 - 49 + 7\sqrt{5} - 2\sqrt{5}$$

$$\frac{-\sqrt{45} - 14 + 2\sqrt{5} + 7\sqrt{3}}{-34}$$

$$\begin{array}{c} \wedge \\ 5 \quad 9 \\ \wedge \\ 3 \quad 3 \end{array}$$

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

③ Solve
and check answers

$$2x = 3\sqrt{x-1} + 1$$



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

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

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

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

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

$$= \frac{13 \pm \sqrt{169 - 160}}{8} = \frac{13 \pm 3}{8} = \left(2, \frac{5}{4}\right)$$

Check: $x=2$

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

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

$$4 = 3 + 1 \quad \checkmark$$

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

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

$$\frac{10}{4} = 3\sqrt{\frac{1}{4}} + 1$$

$$\frac{10}{4} = \frac{3}{2} + 1$$

$$\frac{5}{2} = \frac{5}{2} \quad \checkmark$$