

Math 70 - Exam 4

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Name Key

For all solving problems, solve for complex solutions (real and imaginary).

1. a) Simplify $\sqrt{75}$. Leave your final answer in radical form.

convert $(\sqrt{25}) \sqrt{3} = 5\sqrt{3}$
 perfect leftover

only perfect parts
 convert to non-radicals

b) What two whole numbers does $\sqrt{75}$ fall between?

$\sqrt{64} < \sqrt{75} < \sqrt{81}$
 between 8 ? 9

2. Simplify: $\sqrt{32} - 7\sqrt{50} \rightarrow$ search for perfect factors 4, 9, 16, 25, ...

$(\sqrt{16}) \sqrt{2} - 7(\sqrt{25}) \sqrt{2}$
 perf leftover perfect leftover

$= 4\sqrt{2} - 7 \cdot 5 \sqrt{2} = 4\sqrt{2} - 35\sqrt{2} = -31\sqrt{2}$

3. Simplify: $\sqrt{\frac{5}{12}} = \frac{\sqrt{5}}{\sqrt{12}} = \frac{\sqrt{5}}{\sqrt{4}\sqrt{3}} = \frac{\sqrt{5}}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{15}}{2 \cdot 3}$
 $= \frac{\sqrt{15}}{6}$

square root

4. Simplify: $\sqrt{98x^{12}y^9z^2}$

convert $(\sqrt{49x^{12}y^8z^2}) \sqrt{2y}$
 perfect squares leftover
 $= 7x^6y^4z \cdot \sqrt{2y}$

5. Simplify: $\sqrt[3]{27x^{11}y^6}$

6. Simplify: $(3\sqrt{7})(2\sqrt{7} - 8\sqrt{3})$

$$= (3\sqrt{7})(2\sqrt{7}) - (3\sqrt{7})(8\sqrt{3})$$

$$= 3 \cdot 2 \cdot \sqrt{7} \cdot \sqrt{7} - 3 \cdot 8 \cdot \sqrt{7} \cdot \sqrt{3}$$

$$= 6 \cdot 7 - 24 \cdot \sqrt{21}$$

$$= 42 - 24\sqrt{21} \quad (\text{unlike terms})$$

7. Simplify, rationalizing the denominator: $\frac{\sqrt{y}}{\sqrt{2}-\sqrt{y}} \cdot \frac{\sqrt{2}+\sqrt{y}}{\sqrt{2}+\sqrt{y}}$

$$= \frac{\sqrt{y}(\sqrt{2}+\sqrt{y})}{(\sqrt{2})^2 - (\sqrt{y})^2} = \frac{\sqrt{2y} + \sqrt{y} \cdot \sqrt{y}}{2-y} = \frac{\sqrt{2y} + y}{2-y}$$

8. Solve: $2 + \sqrt{p+1} = 8$ isolate

square both sides

$$\sqrt{p+1} = 6$$

$$(\sqrt{p+1})^2 = 6^2$$

$$p+1 = 36$$

$$p = 35$$

Check $p = 35$

$$2 + \sqrt{35+1} \stackrel{?}{=} 8$$

$$2 + \sqrt{36} = 8 \quad \checkmark$$

6

9. Solve: $\sqrt{30-y} = y$

sq. both sides

$$(\sqrt{30-y})^2 = (y)^2$$

quadratic equation $\rightarrow 30-y = y^2$

$$0 = y^2 + y - 30$$

can factor $\rightarrow 0 = (y+6)(y-5)$

$$y = -6, 5$$

check $y = -6$

$$\sqrt{30 - -6} = -6$$

$$\sqrt{36} \neq -6 \quad \text{no}$$

check $y = 5$

$$\sqrt{30 - 5} \stackrel{?}{=} 5$$

$$\sqrt{25} = 5 \quad \text{yes}$$

only $y = 5$

