

Math 90 -- Exam 3

Instructor: Y. Petersen

Name _____

Note: Where asked to solve, give all solutions, including complex solutions.

1. Find the domain of $\sqrt{5-x}$ $f(x) =$

$$5-x \geq 0$$

$$5 \geq x, x \leq 5$$

$$\{x \mid x \leq 5\} \text{ or } (-\infty, 5]$$

2. Simplify: $2\sqrt{50} + \sqrt{18} - 2\sqrt{27}$

$$2 \cdot \sqrt{25} \sqrt{2} + \sqrt{9} \sqrt{2} - 2 \sqrt{9} \sqrt{3}$$

$$10\sqrt{2} + 3\sqrt{2} - 6\sqrt{3}$$

$$13\sqrt{2} - 6\sqrt{3}$$

3. Simplify: $\sqrt{45xy^7z^{10}}$

$$= \sqrt{9y^6z^{10}} \sqrt{5xy}$$

$$= 3y^3z^5 \sqrt{5xy}$$

4. Simplify: $27^{-2/3}$

$$= \frac{1}{27^{2/3}} = \frac{1}{(3^3)^{2/3}} = \frac{1}{3^2} = \frac{1}{9}$$

5. Simplify: $\frac{\sqrt[5]{6}}{\sqrt[5]{x^3}} \cdot \frac{\sqrt[5]{x^2}}{\sqrt[5]{x^2}} = \frac{\sqrt[5]{6x^2}}{x}$

6. Solve: $\sqrt{3x} + 1 = x - 5$

$$\sqrt{3x} = x - 6$$

$$3x = x^2 - 12x + 36$$

$$0 = x^2 - 15x + 36$$

$$0 = (x - 12)(x - 3)$$

$$x = 12, \cancel{3}$$

Check

$$\underline{x = 12}$$

$$\sqrt{3 \cdot 12} = 12 - 6$$

$$\sqrt{36} = 6 \checkmark$$

Check ²

$$\underline{x = \cancel{3}}$$

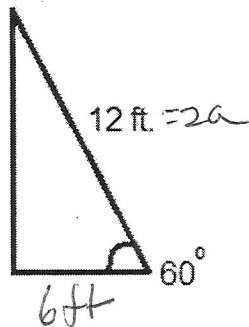
$$\sqrt{3 \cdot 3} + 1 = 3 - 5$$

$$3 + 1 \neq -2$$

$$x = 12 \text{ only}$$

7. A 12-ft ladder leans against a building and makes a 60° angle with the ground.

a) How high is the top of the ladder where it touches the building?



$$a\sqrt{3} = 6\sqrt{3} \text{ ft}$$

b) What is the horizontal distance along the ground from the ladder to the building?

$$a = \frac{12 \text{ ft}}{2} = 6 \text{ ft}$$

8. Find the distance between the points $(-3, 2)$ and $(1, 5)$.

$$d = \sqrt{(1 - (-3))^2 + (5 - 2)^2} = \sqrt{4^2 + 3^2} = 5$$

9. Simplify: $\frac{5+7i}{2-3i}$

$$\frac{2+3i}{2+3i} = \frac{10+15i+14i+\cancel{21i^2}^{-21}}{4-9i^2} = \frac{-11+29i}{13}$$

$$= \frac{-11}{13} + \frac{29}{13}i$$

