

1. Classify each number as to its type: real, irrational, rational, integers, whole numbers, natural numbers.

$$\frac{-8}{4}, \quad 1, \quad \sqrt{6}, \quad \frac{\pi-4}{2e}, \quad 2.5\overline{6}, \quad 0, \quad -7, \quad \sqrt[5]{-99}, \quad 52, \quad \frac{2}{3}, \quad 6-5i$$

2. What properties of real numbers are illustrated in the following?

a. 
$$\frac{6x\sqrt{x^2+5}}{\sqrt{x^2+5}} = 6x$$

b. 
$$e^{-2(x-5)} = e^{-2x+10}$$

c. 
$$(58-x) + 8y = 8y + (58-x)$$

3. 
$$\left(\frac{-9x^7y^{-2}z^5}{6xy^{-2}z^{-5}}\right)^{-3} \left(\frac{2x^{-1}y^0}{3z^4}\right)^2 =$$

$$4. \frac{-10 - \left| -4 - \left| -\frac{8}{5} \right| \right|}{\frac{5}{4}} =$$

$$5. \frac{\left(\frac{-1}{5}\right)^{-4003} + 625^{1000}}{125^{1334} + \left(\frac{1}{25}\right)^{-2000}} =$$

6. What is the distance between  $\frac{-9}{20}$  and  $\frac{8}{15}$ ?

7. What is the domain of  $\sqrt[8]{9x+4}$ ?

8. If  $x > 0$ , rewrite  $\frac{\sqrt{x^9} \sqrt[5]{x^{-2}}}{\sqrt[4]{\frac{1}{x^7}} \sqrt[6]{\frac{\sqrt{x}}{x}}}$  as a single power of  $x$ .

9. Fully factor  $8x^3\sqrt{2x-6} - 2x\sqrt{2x-6}$ .

10.  $\left(\frac{625x^{-12}}{y^{-4}z^{16}}\right)^{\frac{-3}{4}} =$

11.  $(a^2b^3c - 2ab^2 + c^2)(ac^4 - bc) =$

12. Rationalize the denominator of  $\frac{4}{5x-2\sqrt{7}}$ .

13. Factor completely:  $3x^{\frac{12}{7}} - 2187x^{\frac{-2}{7}}$ .

14. What is the degree, leading coefficient, and constant term of the polynomial expression  $2x(3x-4)(x+1)^2$ ?

15.  $\frac{\sqrt[7]{-128}}{\sqrt[3]{(x-8)^5}} =$

16.  $6\sqrt[5]{15x^{10}} + \sqrt[3]{\frac{1875x^7}{125x}} - 2x\sqrt[5]{480x^5} =$

17. Simplify  $(4x^4 - x^2 - 20x) \div (2x - 5)$  by performing polynomial long division.

18. Fully factor  $25x^2 - 60xy + 36y^2$ .

19. Rationalize the denominator of  $\frac{2\sqrt{x}}{2\sqrt{x+h}-2\sqrt{x}}$ .

20.  $\frac{x^5 - x^3 + 125x^2 - 125}{-x^3 - 5x^2 + x + 5} =$