

## P7: Rational Expressions

1. The expression  $\frac{2}{2-\sqrt{8}}$  simplifies to

A)  $-1 - \sqrt{2}$

B)  $1 - \sqrt{2}$

C)  $-1 + \sqrt{2}$

D)  $-2 + \sqrt{2}$

E)  $-2 - \sqrt{2}$

2.  $\frac{2y}{5-y} + \frac{10}{y-4} \div \frac{y^2-25}{y^2+y-20} =$

A) -2

B) 2

C)  $\frac{2y}{(y-5)(y+5)(y-4)}$

D)  $\frac{2y+10}{y-5}$

E)  $\frac{y+5}{(y-5)(y-4)}$

3. The expression  $\frac{\frac{1-t}{1} \frac{1+t}{1}}{\frac{1+t}{1+t} \frac{1-t}{1-t}}$  simplifies to

A) 2

B) -2

C) -1

D) 1

E) 0

4.  $\frac{3(x^2+3)^{-1/3} - 2x^2(x^2+3)^{-4/3}}{(x^2+3)^{-4/3}} =$

A)  $x^2 + 9$

B)  $3(1+x)^{4/3}$

C)  $\frac{3}{(1+x)^{4/3}}$

D)  $(2x+3)(1+x)^{4/3}$

E)  $\frac{2x+3}{(1+x)^{4/3}}$

$$5. \frac{1}{x} + \frac{2}{x-1} - \frac{3x+1}{x^2-1} =$$

A)  $\frac{1}{x(x+1)}$

B)  $\frac{-2}{x^2-1}$

C)  $\frac{1}{x^2-1}$

D)  $\frac{1}{x-1}$

E)  $\frac{1}{x+1}$

$$6. y - \frac{\frac{y-x}{x-y}}{\frac{1}{\frac{1}{y} - \frac{1}{x}}} =$$

A)  $2y + x$

B)  $x - y$

C)  $x$

D)  $\frac{1}{y}$

E)  $y$

7.  $x - \frac{x^2-4}{x^2+2x+4} \div \frac{x^2-2x}{x^3-8} =$

A)  $\frac{4}{x}$

B)  $\frac{x}{4}$

C)  $\frac{4}{x-2}$

D)  $\frac{x-2}{8}$

E)  $\frac{4}{x+2}$

8. When the denominator is rationalized,  $\frac{\sqrt{3}-\sqrt{2}}{2\sqrt{3}+3\sqrt{2}} =$

A)  $\frac{5\sqrt{6}}{6} - 2$

B)  $\frac{5\sqrt{6}}{6} + 2$

C)  $-\frac{5\sqrt{6}}{6} - 12$

D)  $-\frac{5\sqrt{6}}{6} + 12$

E)  $-\frac{5\sqrt{6}}{6} + 2$

9. The domain of the expression  $\frac{x+1}{x^2-x-2}$ , is

A)  $\{x \mid x \neq -1, x \neq 2\}$

B)  $\{x \mid x \neq -1, x \neq 1\}$

C)  $\{x \mid x \neq 2\}$

D)  $\{x \mid x \neq -2\}$

E)  $\{x \mid x \neq -1\}$

10.  $\left(\frac{a^2+2ab+b^2}{a^2-b^2}\right) \div \left(\frac{a^2-ab-2b^2}{2a^2-ab-b^2}\right) =$

A)  $\frac{2a+b}{a-2b}$

B)  $\frac{a-2b}{2a+b}$

C)  $\frac{a+b}{a-b}$

D)  $\frac{a-b}{a+b}$

E) -1

11. The expression  $\frac{x}{x^2-5x+6} + \frac{1}{2-x}$ , simplifies to

A)  $\frac{3}{(x-2)(x-3)}$

B)  $\frac{-3}{(x-2)(x-3)}$

C)  $\frac{2x-3}{(x-2)(x-3)}$

D)  $\frac{2x+3}{(x-2)(x-3)}$

E)  $\frac{3-2x}{(x-2)(x-3)}$

12. The domain of the expression  $\frac{(x-2)(x-4)}{x^2-5x+4}$  is

A)  $(-\infty, 1) \cup (1, 4) \cup (4, \infty)$

B)  $(-\infty, 2) \cup (2, 4) \cup (4, \infty)$

C)  $(-\infty, 1) \cup (1, \infty)$

D)  $(-\infty, 2) \cup (2, \infty)$

E)  $(-\infty, 0) \cup (0, \infty)$

13.  $\frac{2}{x} - \frac{x^2-1}{(x+1)(x-3)} \div \frac{x^2-x}{x-3} =$

A)  $\frac{1}{x}$

B)  $\frac{2}{x(x+1)^2}$

C) 1

D)  $\frac{x+1}{x-3}$

E)  $\frac{x(x-1)^2}{x-3}$

14.  $\frac{x+y}{x-y} \cdot \frac{x^{-1}y-xy^{-1}}{x^{-1}+y^{-1}} =$

A)  $-x - y$

B)  $-x + y$

C)  $x + y$

D)  $x - y$

E)  $-1$

15.  $1 - \frac{1}{1 - \frac{1}{1-x}} =$

A)  $\frac{1}{x}$

B)  $-\frac{1}{x}$

C)  $\frac{1}{x-1}$

D)  $\frac{1}{1-x}$

E)  $\frac{2}{x}$

16.  $\frac{x^2-2x-15}{x^2-6x+5} \div \frac{x^2-x-12}{x^2-1} - \frac{1}{x-4} =$

A)  $\frac{x}{x-4}$

B)  $\frac{x}{x+1}$

C)  $\frac{x}{x-1}$

D)  $\frac{x+1}{x-5}$

E)  $\frac{1}{x-4}$



17. The domain of the expression  $\frac{x^2+5x+4}{(x+4)^3-9x-36}$ , is

A)  $(-\infty, -7) \cup (-7, -4) \cup (-4, -1) \cup (-1, \infty)$

B)  $(-\infty, -7) \cup (-7, \infty)$

C)  $(-\infty, -4) \cup (-4, -1) \cup (-1, \infty)$

D)  $(-\infty, -7) \cup (-7, -1) \cup (-1, \infty)$

E)  $(-\infty, -7) \cup (-7, -4) \cup (-4, \infty)$

18.  $\frac{1}{2+\frac{3}{1+\frac{4}{x}}} =$

A)  $(x + 4)/(5x + 8)$

B)  $(x + 4)/(3x + 8)$

C)  $(x + 4)/(2x + 3)$

D)  $x/(2x + 11)$

E)  $x/(2x + 3)$

19. The expression  $\frac{3x^2-3x-1}{(2x+1)(x-2)} + \frac{1}{2-x}$  is equal to

A)  $\frac{3x+1}{2x+1}$

B)  $\frac{3x-1}{2x+1}$

C)  $\frac{3x+1}{x-2}$

D)  $\frac{3x-1}{x-2}$

E)  $\frac{2x+1}{x-2}$

20.  $\frac{x^{-1}-y^{-1}}{x^{-2}y^{-2}} \div \frac{x^{-2}-y^{-2}}{x^{-3}y^{-3}} =$

A)  $\frac{1}{x+y}$

B)  $\frac{x}{x+y}$

C)  $\frac{y}{x+y}$

D)  $\frac{xy}{x+y}$

E)  $xy(x+y)$

21. The expression  $\frac{\frac{1+x}{1-x} \frac{1-x}{1+x}}{\frac{1}{1+x} \frac{1}{1-x}}$  simplifies to

A) -2

B) 2

C)  $2/x$

D)  $\frac{1}{1-x}$

E)  $\frac{1}{1+x}$

22. The expression  $\frac{x}{x+2} - \frac{x}{x-4} \div \frac{x^2-4}{x^2-6x+8}$  simplifies to

A) 0

B)  $4x$

C)  $-\frac{5x}{x+2}$

D)  $-\frac{6x}{(x+2)^2}$

E)  $\frac{x}{(x+2)^2}$

23. The expression  $\left(x - 1 - \frac{6}{x}\right) \div \left(1 + \frac{2}{x} - \frac{15}{x^2}\right)$  simplifies to

A)  $\frac{x(x+2)}{x+5}$

B)  $\frac{x+2}{x+5}$

C)  $\frac{x+5}{x+2}$

D)  $\frac{x(x+5)}{x+2}$

E)  $5/2$

24. The expression  $\frac{3x}{x^2+x-12} - \frac{x}{x^2-16}$  simplifies to

A)  $\frac{x(2x-9)}{(x-3)(x+4)(x-4)}$

B)  $\frac{x(x-9)}{(x-3)(x+4)(x-4)}$

C)  $\frac{x(x+9)}{(x-3)(x+4)(x-4)}$

D)  $\frac{2x+9}{(x+4)(x-4)}$

E)  $\frac{2x-9}{(x+4)(x-4)}$

25. The expression  $\frac{\frac{x+4}{x} - \frac{3}{x-2}}{\frac{x-2}{x} + \frac{1}{x}}$  simplifies to

A)  $\frac{x^2 - x - 8}{x^2 + x - 2}$

B)  $\frac{x^2 + x - 8}{x^2 + x - 2}$

C)  $\frac{x^2 - x - 8}{x^2 + x + 2}$

D)  $\frac{x^2 + x + 8}{x^2 - x + 2}$

E)  $\frac{x^2 - x + 8}{x^2 - x + 2}$

26. The expression  $\frac{x^2 - 36y^2}{x^2 - 12xy + 36y^2} \div \frac{x^2 + 2xy + y^2}{x^2 - 5xy - 6y^2}$  simplifies to

A)  $\frac{x+6y}{x+y}$

B)  $\frac{x+6y}{x-y}$

C)  $\frac{x+y}{(x-6y)^2}$

D)  $(x - 6y)^2$

E)  $\frac{x-y}{x-6y}$

27. The Least Common Denominator (LCD) of the expression  $\frac{p}{2p^2-9p-5} -$

$\frac{2p}{6p^2-p-2}$  is:

A)  $(2p + 1)(p - 5)(3p - 2)$

B)  $(2p + 1)^2(p - 5)(3p - 2)$

C)  $(2p + 1)(p + 5)(3p - 2)$

28. The expression  $\frac{m - \frac{8-4m}{m^2-4}}{\frac{1}{m+2}}$  simplifies to:

A)  $m^2 + 2m + 4$

B)  $m^2 - 2m + 4$

C)  $m^2 + 4m + 4$

D)  $m^2 - 4m + 4$

E)  $m^2 + 2m - 4$

29. If  $\frac{x - \frac{8}{x-2}}{x - \frac{x+10}{x-2}} = \frac{x-a}{x-b}$ , then  $a + b =$

A) 9

B) 18

C) 2

D) 10

E) 12

30. The expression  $\frac{x^{-1}y - xy^{-1}}{x^{-1} - y^{-1}}$  simplifies to:

A)  $x + y$

B)  $\frac{y+x}{xy}$

C)  $y - x$

D)  $\frac{xy}{x+y}$

E) 1

31.  $\frac{x-7}{x-2} + \frac{5}{x^2+2x+4} \div \frac{x^2-4x+4}{x^3-8} =$

A) 1

B) -1

C)  $\frac{x+1}{x-2}$

D)  $\frac{x}{x-2}$

E)  $\frac{1}{x-2}$

32. The domain of the expression  $\frac{(x-2)(x+2)}{(x-2)(x-3)}$  is:

A)  $\{x \mid x \neq 2 \text{ and } x \neq 3\}$

B)  $\{x \mid x \neq 3\}$

C)  $\{x \mid x \neq 2 \text{ and } x \neq -2\}$

D)  $\{x \mid x \neq 2\}$

E)  $(-\infty, \infty)$



33.  $\left[1 - \frac{5x-7}{x^2-1}\right] \div \frac{x-3}{x^2-1} =$

A)  $x + 3$

B)  $x - 3$

C)  $x - 1$

D)  $x + 2$

E)  $x - 2$

34. If  $\frac{1 - \frac{3}{x+4}}{\frac{1}{x+4} + \frac{x}{3}} = \frac{ax+3}{x+b}$ , then  $a + b =$

A) 2

B) 3

35. If  $x < y$ , then  $\frac{x-y}{\sqrt{x^2-2xy+y^2}} =$

A) -1

36. If  $\frac{x^2+8x+16}{x^2+2x-3} \div \frac{x+4}{x-1} = \frac{x+a}{x+b}$ , then  $a + b =$

A) 7

37. The expression  $\frac{y^2-1}{\sqrt{y}+1}$  simplifies to

A)  $(y-1)(\sqrt{y}-1)$

B)  $y(\sqrt{y}-1)$

C)  $(y+1)(\sqrt{y}+1)$

D)  $(y+1)(\sqrt{y}-1)$

38. If  $\left(\frac{3}{2-x} + \frac{x-1}{x^2-x-2}\right) \div \frac{x^2-4}{3x+3} = \frac{A}{(x-B)^2}$ , then  $A + B =$

A) -4

39.  $\frac{ab^{-1}-ba^{-1}}{a^{-1}-b^{-1}} =$

A)  $\frac{1}{a-b}$

B)  $a + b$

C)  $a - b$

(D)  $-a - b$

40.  $R = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}}$ . If  $R_1 = 0.2\text{ohms}$  and  $R_2 = 0.8\text{ohms}$ , then  $R =$

A) 0.16ohms

B) 16ohms.

C) 6 ohms.

D) 32 ohms.

E) 160ohms.

41. The domain of the expression  $\frac{\sqrt{x}}{x^2+x-2}$  is

- A)  $(-\infty, \infty)$
- B)  $(-2, 0) \cup (1, \infty)$
- C)  $[0, 1) \cup (1, \infty)$
- D)  $(-2, 0) \cup (0, \infty)$
- E)  $(0, 2) \cup (2, \infty)$

42. Which one of the following statements is TRUE ?

- A)  $\sqrt{A+B} = \sqrt{A} + \sqrt{B}$ , for any positive real numbers  $A$  and  $B$
- B)  $(A+B)^3 = (A+B)(A^2 + AB + B^2)$ , for any real numbers  $A$  and  $B$
- C)  $\frac{A}{B+C} = \frac{A}{C} + \frac{A}{B}$ , for any real numbers  $A, B$  and  $C$
- D)  $7^{100} + 7^{101} = 8 \times 7^{100}$
- E)  $\sqrt[4]{A^4} = A$ , for any real number  $A$ .

$$43. \frac{x-1}{3} - \frac{2x^2-5x+2}{x^3-8} \cdot \frac{x^2+2x+4}{6x-3} =$$

A)  $\frac{x-1}{2x-1}$

B)  $\frac{x-2}{3}$

C)  $\frac{x}{3}$

D)  $\frac{x-1}{3}$

E)  $\frac{x-2}{2x-1}$

$$44. \left( \frac{xy^{-2} - x^{-2}y}{x^{-3} - y^{-3}} \right)^{-2} =$$

A)  $\frac{1}{x^2y^2}$