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 $\dfrac{\frac{1-t}{1+t}-\frac{1+t}{1-t}}{\frac{1}{1+t}-\frac{1}{1-t}}$ simplifies to

A) 2

B) -2

C) -1

D) 1

E) 0

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

A) x^2+9

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

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

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

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

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

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 $\frac{\frac{x+4}{x}-\frac{3}{x-2}}{\frac{x}{x-2}+\frac{1}{x}}$ 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) $\frac{1}{x^2y^2}$

45. If $A = \sqrt{18} + \sqrt{32} - \sqrt{8}$, then $\frac{1}{A-7} =$

A) $5\sqrt{2} + 7$

B) $9\sqrt{2} - 7$

C) $7\sqrt{2} + 5$

D) $7\sqrt{2} - 5$

E) $9\sqrt{2} + 5$