

1. Factored completely, the expression $12x^4 + 10x^3 - 12x^2$ is equivalent to

1) $x^2(4x+6)(3x-2)$

2) $2(2x^2+3x)(3x^2-2x)$

3) $2x^2(2x-3)(3x+2)$

4) $2x^2(2x+3)(3x-2)$

$$2x^2(6x^2 + 5x - 6) \quad \begin{matrix} -3b \\ a \\ -4 \end{matrix}$$

$$= 2x^2(6x^2 + 9x - 4x - 6)$$

$$= 2x^2(3x(\underline{2x+3}) - 2(\underline{2x+3}))$$

$$= (2x^2)(2x+3)(3x-2)$$

2. The expression $x^2(\underline{x+2}) - (\underline{x+2})$ is equivalent to

1) x^2

2) $x^2 - 1$

3) $x^3 + 2x^2 - x + 2$

4) $(x+1)(x-1)(x+2)$

$$(x+2)(x^2-1)$$

$$= (x+2)(x-1)(x+1)$$

3. When $\frac{\cancel{3-x}^{-1}}{\cancel{x-3}}$, where $x \neq 3$, is simplified, it is equal to

- 1) 1
2) -1

- 3) 0
4) 2

4. The expression $\frac{x^2 + 9x - 22}{x^2 - 121} \div \underline{2-x}$ is equivalent to

- 1) $x - 11$
2) $\frac{1}{x - 11}$

- 3) $\frac{11 - x}{11 - x}$
4) $\frac{1}{11 - x}$

$$\frac{\cancel{(x+11)}\cancel{(x-2)}^{-1}}{\cancel{(x+11)}(x-11)} \cdot \frac{1}{\cancel{2-x}} = \frac{(-1)(-1)}{(x-11)(-1)} = \frac{1}{11-x}$$

5. What is the sum of $\frac{3}{x-3}$ and $\frac{x-1}{3-x}$?

1) 1

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

2) -1

4) 0

$$= \frac{3}{x-3} + \frac{-x}{x-3}$$

$$= \frac{3-x}{x-3}$$

6. Expressed as a single fraction, what is $\frac{1}{x+1} + \frac{1}{x}$, $x \neq 0, -1$?

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

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

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

4) $\frac{3}{x^2}$

$$x \left(\frac{1}{x+1} \right) + \frac{1(x+1)}{x(x+1)}$$

$$= \frac{x}{x(x+1)} + \frac{x+1}{x(x+1)} = \frac{2x+1}{x(x+1)}$$

Part II – Free Response (10 pts each)

7. Factor: $3x^2 + x - 2$ $\begin{matrix} -6 \\ 3 \end{matrix}$ $\begin{matrix} -2 \end{matrix}$

$$3x^2 + 3x - 2x - 2$$

$$= 3x(x+1) - 2(x+1)$$

$$= (x+1)(3x-2)$$

8. Factor: $a^4 - 1$

$$= (a^2 + 1)(a^2 - 1)$$

$$= (a^2 + 1)(a - 1)(a + 1)$$

9. Factor: $ab - 3a - 2b + 6$

$$= a(b-3) - 2(b-3)$$

$$= (b-3)(a-2)$$

10. What is the sum of $(y-5) + \frac{3}{y+2}$?

$$= \frac{y^2 - 3y - 10}{y+2} + \frac{3}{y+2}$$

$$= \frac{y^2 - 3y - 7}{y+2}$$

$$\frac{(y+2)(y-5) + 3}{(y+2)}$$

$$\frac{2 \cdot 5 + 6}{2}$$

11. Express in simplest form: $\frac{3a+1}{a^2-1} - \frac{1}{a+1}$

$$= \frac{3a+1}{(a+1)(a-1)} - \frac{1(a-1)}{(a+1)(a-1)}$$

$$= \frac{3a+1-a+1}{(a+1)(a-1)} = \frac{2a+2}{(a+1)(a-1)}$$

$$= \frac{\cancel{2(a+1)}}{\cancel{(a+1)}(a-1)} = \frac{2}{a-1}$$