Do you really understand??...Let's find out...

$$\frac{2x-3}{3x^2}+\frac{3x+3}{9x}$$

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

$$=\frac{6x-9+3x^2+3x}{9x^2}$$

$$=\frac{3x^2+9x-9}{9x^2}$$

$$=\frac{\cancel{3}(x^2+3x-3)}{\cancel{9}_3x^2}$$

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

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

$$\frac{4y}{(y-1)(y+1)}-\frac{2}{y}-\frac{2}{y+1}$$

$$=\frac{4y(y)-2(y-1)(y+1)-2y(y-1)}{(y-1)(y+1)(y)}$$

$$=\frac{4y^2-2(y^2-1)-2y^2+2y}{(y-1)(y+1)(y)}$$

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

$$=\frac{2}{(y-1)y}\quad y\neq 1,-1,0$$

$$\frac{2z}{1-2z}+\frac{3z}{2z+1}-\frac{3}{4z^2-1}$$

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

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

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

$$=\frac{-4z^2-2z+6z^2-3z-3}{(2z-1)(2z+1)}$$

$$=\frac{2z^2-5z-3}{(2z+1)(2z-1)}\quad -6$$

$$\rightarrow 2z^2-6z+z-3$$

$$2z(z-3)+1(z-3)$$

$$(2z+1)(z-3)$$

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

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

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

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

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

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

-12

$3x^2-6x+2x-4$

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

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

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

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

Part II : Open Response

Show all work for each of the following in the space provided.

1. Simplify each of the following rational expressions and state all restrictions on the variables: [17]

(a) $\frac{v^2-3v-40}{v^2-11v+24}$

$$\frac{\cancel{(v-8)}(v+5)}{\cancel{(v-8)}(v-3)}$$

$$\frac{v+5}{v-3},\ v \neq 8, 3$$

(b) $\frac{20n^3+4n^2}{50n^2+10n} \div \frac{4n^2}{6n^5}$

$$\frac{4n^2\cancel{(5n+1)}}{10n\cancel{(5n+1)}} \cdot \frac{6n^5}{4n^2} = \frac{24n^{\cancel{7}\,4}}{40\cancel{n^3}}$$

$$= \frac{3}{5}n^4$$

$$n \neq 0, -\frac{1}{5}$$

(c) $\frac{2}{x+3} - \frac{4}{x-6} + \frac{5}{x}$

(d) $\frac{x^2+3x-4}{x^2-9x+20} \div \frac{4x+24}{25-x^2} \times \frac{x^2+2x-24}{x^2+x-12} \div \frac{x^2+4x-5}{2x-6}$

$$\frac{2(x)(x-6) - 4x(x+3) + 5(x+3)(x-6)}{x(x+3)(x-6)}$$

$$= \frac{2x^2-12x-4x^2-12x+5(x^2-3x-18)}{x(x+3)(x-6)}$$

$-15x$

$$= \frac{3x^2-39x-90}{x(x+3)(x-6)} \leftarrow 3(x^2-13x-30)$$

$$\boxed{\frac{3(x-15)(x+2)}{x(x+3)(x-6)}}$$

2. Solve the following equation: $\sqrt{x-2} - \sqrt{2x-6} = 1$ [6]

$$(\sqrt{x-2})^2 = (1+\sqrt{2x-6})^2$$

$$x-2 = 1 + 2\sqrt{2x-6} + 2x - 6$$

$$x-2-1-2x+6 = 2\sqrt{2x-6}$$

$$(-x+3)^2 = (2\sqrt{2x-6})^2$$

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

$$x^2-6x+9 = 8x-24$$

$$x^2-14x-33=0$$

$$(x-11)(x-3)=0$$

$$x=11,\ 3$$

extraneous

Verify:

	LS	RS
$x=11$		
$x=3$		

(d) $\dfrac{x^2+3x-4}{x^2-9x+20} \div \dfrac{4x+24}{25-x^2} \times \dfrac{x^2+2x-24}{x^2+x-12} \div \dfrac{x^2+4x-5}{2x-6}$

$$\frac{\cancel{(x+4)}\cancel{(x-1)}}{\cancel{(x-5)}\cancel{(x-4)}} \cdot \frac{-1\,\cancel{(5-x)}\cancel{(5+x)}}{4\,\cancel{(x+6)}} \cdot \frac{\cancel{(x+6)}\cancel{(x-4)}}{\cancel{(x+4)}\cancel{(x-3)}} \cdot \frac{2\,\cancel{(x-3)}}{\cancel{(x+5)}\cancel{(x-1)}}$$

$x \neq 5, 4, -6, -5, 3, 1, -4$

$$= -\frac{2}{4} = \frac{-1}{2}$$