INTERMEDIATE ALGEBRA

Useful Guidelines: [a, b, and c are nonzero real number.]

To add or subtract rational expressions:

* If the denominators are the same, add or subtract the numerators and place the result over the common denominator: $\dfrac{a}{c}+\dfrac{b}{c}=\dfrac{a+b}{c}$ or $\dfrac{a}{c}-\dfrac{b}{c}=\dfrac{a-b}{c}$. but $\dfrac{a}{b}\cdot\dfrac{g}{c}+\dfrac{c\cdot b}{d}=\dfrac{ad+cb}{cd}$

* If the denominators are different, then
  Step 1: Write the rational expressions with the least common denominator (LCM),
  Step 2: Add or subtract the numerators and place the result over the common denominator.

* Finally, check that the answer is in lowest terms.

Evaluate the following:

1. a) $\dfrac{3}{x}-\dfrac{1}{2x^2}=$ $\dfrac{6x-1}{2x^2}$

   b) $\dfrac{4k+7}{k+2}-\dfrac{3k+1}{k+2}=\dfrac{4k+7-3k-1}{k+2}$

   $=\dfrac{k+6}{k+2}$ "Lowest Terms"

2. a) $\dfrac{3}{m-2}-\dfrac{1}{m+2}=\dfrac{3(m+2)-1(m-2)}{(m-2)(m+2)}$

   $=\dfrac{3m+6-m+2}{(m-2)(m+2)}$

   $=\dfrac{2m+8}{(m-2)(m+2)}=\dfrac{2(m+4)}{(m-2)(m+2)}$

   b) $\dfrac{3a-2}{c^2-16}-\dfrac{2b+2}{c^2-16}=\dfrac{3a-2-2b-2}{(c-4)(c+4)}$

   $=\dfrac{3a-2b-4}{(c-4)(c+4)}$

3. a) $\dfrac{3z}{z^2-25}+\dfrac{2z}{z-5}=\dfrac{3z}{(z-5)(z+5)}+\dfrac{2z}{(z-5)}$

   $=\dfrac{3z+2z(z+5)}{(z-5)(z+5)}$

   $=\dfrac{3z+2z^2+10z}{(z-5)(z+5)}$

   $=\dfrac{2z^2+13z}{(z-5)(z+5)}=\dfrac{z(2z+13)}{(z-5)(z+5)}$

   b) $\dfrac{3y}{y^2-4}+\dfrac{2y}{2-y}-\dfrac{5}{y-2}=\dfrac{3y}{(y-2)(y+2)}-\dfrac{2y}{(y-2)}-\dfrac{5}{(y-2)}$

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

   $=\dfrac{3y-2y^2-4y-5y-10}{(y-2)(y+2)}$

   $=\dfrac{-6y-2y^2-10}{(y-2)(y+2)}$

   $=\dfrac{-2(y^2+3y+5)}{(y-2)(y+2)}$

4. $\dfrac{2x}{x^2+4x+3}+\dfrac{x}{2x^2+3x+1}$

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

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

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

   $=\dfrac{5x^2+5x}{(x+1)(x+3)(2x+1)}$

   $=\dfrac{5x(x+1)}{(x+1)(x+3)(2x+1)}=\boxed{\dfrac{5x}{(x+3)(2x+1)}}$