How would you simplify this without using a calculator?

$$\frac{3+\frac{4}{3}}{\frac{11}{6}-1}$$

Complex Fractions: (also known as Compound Fractions)
Fractions whose numerators and/or denominators also have fractions.

Simplify:

$$\frac{3+\frac{4}{3}}{\frac{11}{6}-1}$$

There are many methods to do this, I'll focus on two methods.

$$\frac{3+\frac{4}{3}}{\frac{11}{6}-1}$$

One method:

1. Find LCM of all the denominators in the complex fraction.
2. Then multiply the numerator and denominator of the complex fraction by this LCM.
   This is called "clearing the denominators".
3. Simplify what remains.

LCM = 6

$$\frac{6}{6}\cdot\frac{\left(3+\frac{4}{3}\right)}{\left(\frac{11}{6}-1\right)} = \frac{18+8}{11-6} = \frac{26}{5}$$

Another method:

$$\frac{3+\frac{4}{3}}{\frac{11}{6}-1}$$

1. Get ALL the "parts" of the complex fraction to have the LCD.
2. Then you can cancel all of the denominators.
3. Simplify what remains.

LCD = 6

$$\frac{6}{6}\cdot\frac{3+\frac{4}{3}}{\frac{11}{6}-1}\cdot\frac{2}{2}\cdot\frac{6}{6} = \frac{18+8}{11-6} = \frac{26}{5}$$

Simplify:

$$\frac{24}{24}\cdot\frac{\left(\frac{2}{3}-\frac{7}{8}\right)}{\left(\frac{3}{4}+\frac{5}{6}\right)}$$

LCD = 24

$$\frac{16-21}{18+20} = \frac{-5}{38}$$

Simplify:

$$\frac{c^5d^4}{c^5d^4}\cdot\frac{\left(\frac{3}{c^5d^2}+\frac{11}{cd^3}\right)}{\left(\frac{4}{c^3d^4}-\frac{5}{c^2}\right)}$$

LCD = c^5d^4

$$\frac{3d^2+11c^4d}{4c^2-5c^3d^4}$$

Simplify:

$$\frac{24x^5y^4}{24x^5y^4}\cdot\frac{\left(\frac{9}{8x^3y}-\frac{5}{12xy}\right)}{\left(\frac{3}{4x^2y^4}-\frac{7}{6x^5}\right)}$$

LCD = $24x^5y^4$

$$\frac{27x^2y^3-10x^4y^3}{18x^3-28y^4}$$

Simplify:

$$\frac{x-5}{x-5}\cdot\frac{\left(6+\frac{2}{x-5}\right)}{\left(\frac{1}{x-5}-8\right)} = \frac{6(x-5)+2}{1-8(x-5)}$$

$$= \frac{6x-30+2}{1-8x+40}$$

$$= \boxed{\frac{6x-28}{-8x+41}}$$

Simplify:

$$\frac{\frac{3}{x+2}}{\frac{1}{x+5}+\frac{10x}{x^2+7x+10}} \rightarrow (x+5)(x+2)$$

$$\frac{(x+2)(x+5)}{(x+2)(x+5)}\cdot\frac{\frac{3}{x+2}}{\frac{1}{x+5}+\frac{10x}{(x+5)(x+2)}} = \frac{3(x+5)}{1(x+2)+10x}$$

$$= \boxed{\frac{3(x+5)}{11x+2}}$$

Simplify:

$$\frac{\frac{4x}{x^2+8x+7}}{\frac{5x}{x^2+6x-7}+\frac{6}{x^2-1}}$$

$x^2+8x+7 \rightarrow (x+7)(x+1)$

$x^2+6x-7 \rightarrow (x+7)(x-1)$

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

$$\frac{(x+7)(x+1)(x-1)}{(x+7)(x+1)(x-1)}\cdot\frac{\frac{4x}{(x+7)(x+1)}}{\frac{5x}{(x+7)(x-1)}+\frac{6}{(x+1)(x-1)}} = \frac{4x(x-1)}{5x(x+1)+6(x+7)}$$

$$= \frac{4x(x-1)}{5x^2+5x+6x+42}$$

$$= \boxed{\frac{4x(x-1)}{5x^2+11x+42}}$$

Hwk #37

Due tomorrow

Practice Sheet - Complex Rational Expressions