More Integration Techniques: Partial Fractions & Trig Integrals

We have looked at integrals like $\int \frac{x+5}{x^2+10x}\,dx$ and have been able to use u-substitution for them.

Why does u-substitution work for this problem?

Would u-substition work for this problem? $\int \frac{8x+82}{x^2+3x-10}\,dx$

Let's look at how to deal with that last problem.

$$\int \frac{8x+82}{x^2+3x-10}\,dx$$

We need to simplify the denominator so let's try "unadding" the fraction to see what we get. Maybe we can deal with that.

$$\frac{8x+82}{x^2+3x-10} = \_\_\_\_\_ + \_\_\_\_\_$$

Now try integrating!

How about these?

$$\int \frac{x-4}{x^2-6x+5}\,dx$$

$$\int \frac{2}{x^2-x-20}\,dx$$

These are a little harder, try them.

$$\int \frac{x^2+12x+12}{x^3-4x}\,dx$$

$$\int \frac{x^3-9x^2+24x-17}{x^2-6x+5}\,dx$$

Now let's look at some trig integrals. You will need to use your trig identities to rewrite the original problem before you can integrate!

$$\int \sin^3 x \cos^4 x \, dx$$

$$\int_{\pi/6}^{\pi/3} \frac{\cos^3 x}{\sqrt{\sin x}} \, dx$$

How about these?

$$\int \cos^4 x dx$$

$$\int \frac{\tan^3 x}{\sqrt{\sec x}} dx$$