problem ?

$$\int \frac{\sin 2x}{1+\cos^2 x}\ dx$$

The formulas to remember are:

$$\cos s+t = \cos s \cos t - \sin s \sin t$$

$$\sin s+t = \sin s \cos t + \cos s \sin t$$

If $s = t$ the second one becomes:

$$\sin 2s = 2 \sin s \cos s$$

So our problem is now:

$$\int \frac{2 \sin x \cos x}{1+\cos^2 x}\ dx$$

Notice that

$$\frac{d}{dx} \cos^2 x = -2 \cos x \sin x\ dx$$

That leads to the idea of letting

$$u = 1 + \cos^2 x$$

$$du = -2 \cos x \sin x\ dx$$

So the integral is

$$= \int \frac{-du}{u}$$

$$= -\ln u$$

$$= -\ln(1+\cos^2 x) + C$$

We don't need absolute value signs because $1 + \cos^2 \geq 0$. Check by differentiating. Remember the minus sign, the rest is

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

so, with the minus sign we have our integrand back again. Check.