Problem 7 in Section 1.2. Solve the Initial Value Problem

$$\boxed{\frac{dy}{dx} = \frac{10}{x^2+1} \quad \text{and} \quad y(0) = 0.}$$

Solution. Separate the variables and integrate:

$$\int 1 dy = \int \frac{10}{x^2+1}\, dx$$

$$y = 10 \arctan x + C$$

Use $0 = y(0)$ to see that

$$0 = y(0) = 10 \arctan(0) + C = C.$$

$$\boxed{y = 10 \arctan x.}$$

Check. We compute

$$\frac{dy}{dx} = \frac{10}{x^2+1} \checkmark$$

and $y(0) = 10(0) = 0 \checkmark$.