Answer on Question #72508, Math / Differential Equations.

Task. y=2^x.sin(tanx).dy/dx.

Solution.

1) We find $\frac{dy}{dx}$ where $y = 2^x \sin(\tan x)$.

So,

$$\frac{dy}{dx} = \left(2^x \sin(\tan x)\right)' = \left(2^x\right)' \sin(\tan x) + 2^x \left(\sin(\tan x)\right)' =$$

$$= 2^x \ln 2 \sin(\tan x) + 2^x \cos(\tan x)\left(\tan x\right)' = 2^x \ln 2 \sin(\tan x) + 2^x \cos(\tan x)\frac{1}{\cos^2 x}.$$

Answer: $\frac{dy}{dx} = 2^x \ln 2 \sin(\tan x) + 2^x \cos(\tan x)\frac{1}{\cos^2 x}$.

2) We find the general solution of the equation $y = 2^x \sin(\tan x)\frac{dy}{dx}$.

So,

$$\frac{dy}{y} = \frac{dx}{2^x \sin(\tan x)},$$

$$\int \frac{dy}{y} = \int \frac{dx}{2^x \sin(\tan x)},$$

$$\ln y = \int \frac{dx}{2^x \sin(\tan x)},$$

$$y = e^{\int \frac{dx}{2^x \sin(\tan x)}}.$$

Answer: $y = e^{\int \frac{dx}{2^x \sin(\tan x)}}$.