

Please PRINT your name _____

No calculators, cell phones, computers, notes, etc.

Circle your answer. Make your work correct, complete and coherent.

Please take a picture of your quiz (for your records) just before you turn the quiz in. I will e-mail your grade and my comments to you. I will keep your quiz.

The quiz is worth 5 points. The solutions will be posted on my website later today.

Quiz 2, January 24, 2024

Solve

$$(1-x^2)\frac{dy}{dx} = 2y.$$

Check that your answer is correct.

ANSWER: Separate the variables:

$$\frac{dy}{y} = \frac{2dx}{1-x^2}.$$

Integrate both sides:

$$\begin{aligned}\ln|y| &= \int \left(\frac{-1}{x-1} + \frac{1}{x+1} \right) dx \\ \ln|y| &= -\ln|x-1| + \ln|x+1| + C.\end{aligned}$$

Exponentiate

$$|y| = e^{C\frac{x+1}{x-1}}$$

Thus,

$$y = \pm e^{C\frac{x+1}{x-1}}.$$

Let $K = \pm e^C$.

$$\boxed{y = K\frac{x+1}{x-1}}$$

Check. The proposed answer satisfies the DE because

$$y' = -K\frac{x+1}{(x-1)^2} + \frac{1}{x-1} = K\frac{-2}{(x-1)^2}.$$

It follows that

$$(1-x^2)\frac{dy}{dx} = K(1-x)(1+x)\frac{-2}{(x-1)^2} = K\frac{2(1+x)}{x-1} = 2y.$$