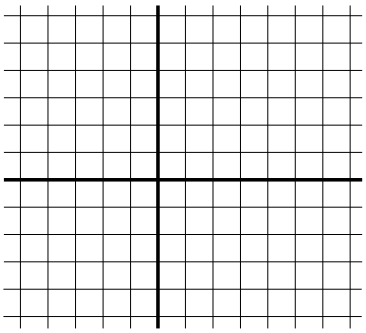
Quiz 1 SHOW ALL WORK
Sept 7, 2018

[10] 1.) Draw the direction field for $y' = (y+1)(y-3)$

Click on 9/10 date for solution:



[10] 2.) Solve $y' = \frac{1}{x(2y+3)}$, $y(1) = -2$

$\frac{dy}{dx} = \frac{1}{x(2y+3)}$ Compare to 2.2: 14

Separate variables: $(2y+3)dy = \frac{dx}{x}$

$y^2 + 3y = ln|x| + C.$

$y^2 + 3y - ln|x| - C = 0.$

$y = \frac{-3 \pm \sqrt{9-4(-ln|x|-C)}}{2} = \frac{-3 \pm \sqrt{9+4ln|x|+C}}{2} = \frac{-3 \pm \sqrt{4ln|x|+C}}{2}$

General solution: $y = \frac{-3 \pm 2\sqrt{ln|x|+C}}{2}$

IVP: $y(1) = -2$

$-2 = \frac{-3 \pm 2\sqrt{ln|1|+C}}{2} = \frac{-3 \pm 2\sqrt{C}}{2}$

$-4 = -3 \pm 2\sqrt{C}$. Thus $-1 = \pm 2\sqrt{C}$. Hence $-1 = -2\sqrt{C}$.

Thus $\sqrt{C} = \frac{1}{2}$ and $C = \frac{1}{4}$

Hence IVP solution: $y = \frac{-3-2\sqrt{ln|x|+\frac{1}{4}}}{2} y = \frac{-3-2\sqrt{\frac{4ln|x|+1}{4}}}{2} = \frac{-3-\sqrt{4ln|x|+1}}{2}$

Answer: $y = \frac{-3-\sqrt{1+4ln|x|}}{2}$