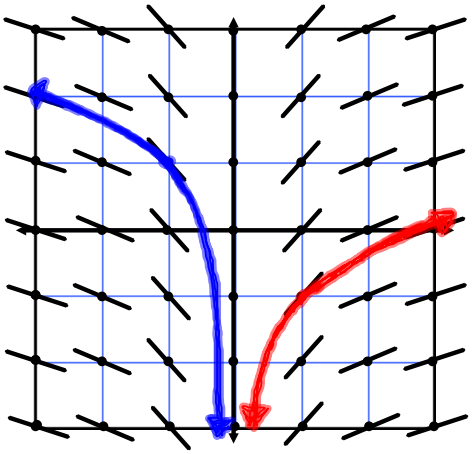
Draw the slope field for each differential. Draw the graph of the solution through the given point(s). Then solve the differential equation for each point.

1) $dy = \frac{1}{x}\,dx$ (1, -1) and (-1,1)

$$\int dy = \int \frac{1}{x}\,dx$$

$$y = \ln|x| + C$$

$$|x| = \begin{cases} x & , x \geq 0 \\ -x & , x < 0 \end{cases}$$



$y = \ln x - 1$

$y = \ln(-x) + 1$

2) $dy = \sqrt{x+2}\,dx$; (0,-1)

$$\int dy = \int \sqrt{x+2}\,dx \qquad u = x+2,\ du = dx$$

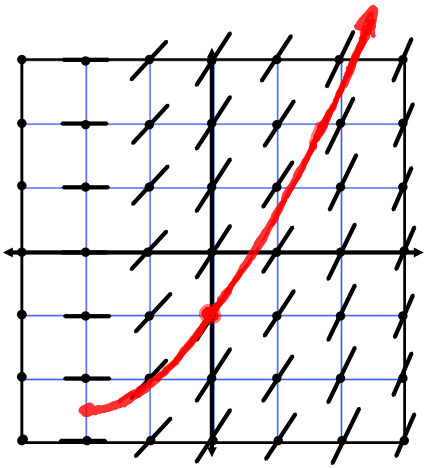
$$y = \int \sqrt{u}\,du$$

$$y = \frac{2}{3}u^{\frac{3}{2}} + C$$

$$y = \frac{2}{3}\sqrt{(x+2)^3} + C$$

$$-1 = \frac{2}{3}\sqrt{(0+2)^3} + C$$

$$-1 = \frac{2}{3}\sqrt{8} + C \qquad -1 = \frac{4\sqrt{2}}{3} + C$$



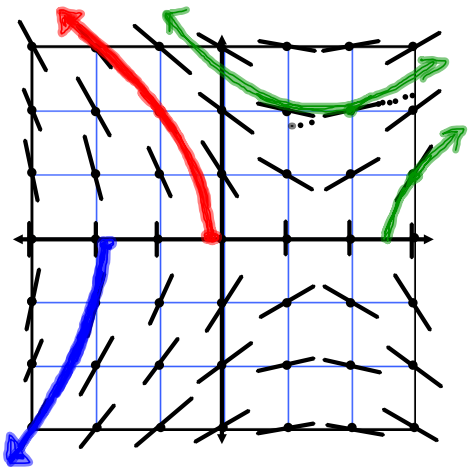
$y = \frac{2}{3}\sqrt{(x+2)^3} + \frac{-3-4\sqrt{2}}{3}$

3) $dy = \frac{2x - 3}{2y}\,dx$ (-1,2) and (-2,-1)

$\int 2y\,dy = \int (2x-3)\,dx$

$y^2 = x^2 - 3x + C$

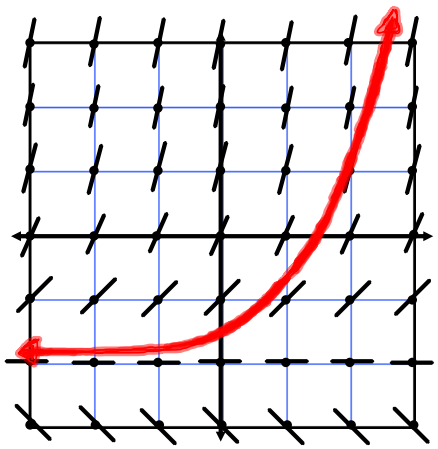
$y = \pm\sqrt{x^2 - 3x + C}$



$y = \sqrt{x^2 - 3x}$

$y = -\sqrt{x^2 - 3x - 9}$

4) $dy = (y + 2)\,dx$; (2,1)



$y = \frac{3}{e^2}e^x - 2$