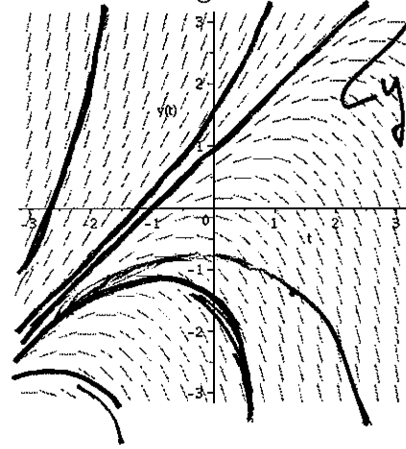
4.) Circle the general solution to the differential equation whose direction field is given below:



$y = t + 1$

$c = 0$

~~A)~~ $\cancel{y = t + C}$

~~B)~~ $\cancel{y = t^2 + C}$

~~C)~~ $\cancel{y = e^t + C}$

D) $y = Ce^t + t + 1$

E) $y = \cancel{C}e^t$

~~F)~~ $\cancel{y = e^t + t + C}$

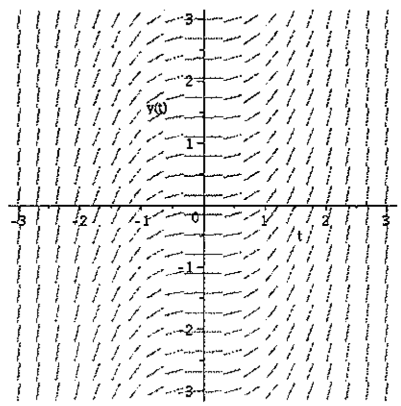
~~G)~~ $\cancel{y = ln(t) + C}$

~~H)~~ $\cancel{y = C}$

~~I)~~ $\cancel{y = sin(t) + C}$

~~J)~~ $\cancel{y = cos(t) + C}$

5.) Which of the following could be the general solution to the differential equation whose direction field is given below:



A) $y = t + C$

B) $y = t^2 + C$

C) $y = e^t + C$

D) $y = \frac{(t-1)^3}{3} + C$

E) $y = Ce^t$

F) $y = \frac{t^3}{3} + C$

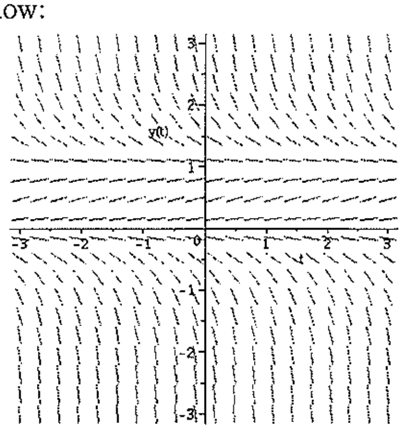
G) $y = ln(t) + C$

H) $y = C$

I) $y = \frac{Ct^3}{3}$

J) $y = \frac{C(t-1)^3}{3}$

6.) Circle the differential equation whose direction field is given below:



A) $y' = t^2$

B) $y' = y + 3$

C) $y' = e^t$

D) $y' = t + 1$

E) $y' = t - y$

F) $y' = y - t$

G) $y' = (1 + y)(1 - y)$

H) $y' = y(1 + y)$

I) $y' = t(1 - t)$

J) $y' = y(1 - y)$

8.4) $\frac{dy}{\cancel{dt}(1-3y)}\cancel{dt} = \frac{t^2(1-3y)\cancel{dt}}{1-3y}$

$$\int \frac{dy}{1-3y} = \int \underset{\substack{\uparrow \\ \text{height}}}{t^2} \cdot \underset{\substack{\uparrow \\ \text{width}}}{dt}$$

Let $u=(1-3y) \Rightarrow \frac{du}{-3} = \frac{-3dy}{-3}$

$\Rightarrow \frac{du}{-3} = dy$

$$-\cancel{3}\left[\int \frac{du}{-\cancel{3}u}\right] = \left[\frac{t^3}{3} + C\right](-3)$$

$$\int \frac{du}{u} = -t^3 + C$$

$$\ln|u| = -t^3 + C$$

$$e^{\ln|1-3y|} = e^{-t^3 + C}$$

$$|1-3y| = e^{-t^3} e^{c}$$

$$1-3y = (\pm e^{c}) e^{-t^3}$$

$$1-3y = Ce^{-t^3}$$

$$\frac{-3y}{-3} = \frac{Ce^{-t^3} - 1}{-3} \Rightarrow y = \boxed{\frac{-Ce^{-t^3}+1}{+3}} \text{ or } \boxed{Ce^{-t^3} + \frac{1}{3}}$$

$$\frac{dy}{dt} = \frac{\sin t + 1}{\cos y + 2y}$$

$$\int (\cos y + 2y)\, dy = \int (\sin t + 1)\, dt$$

$$\boxed{\sin y + y^2 = -\cos t + t + C}$$

implicit sol'n

$$\boxed{\sin y + y^2 + \cos t - t = C}$$

IVP: $y(0) = \pi$

$$\underbrace{\sin \pi}_{0} + \pi^2 + \cos(0) - 0 = C$$

$$\pi^2 + 1 = C$$

IVP sol'n

$$\boxed{\sin y + y^2 + \cos t - t = \pi^2 + 1}$$

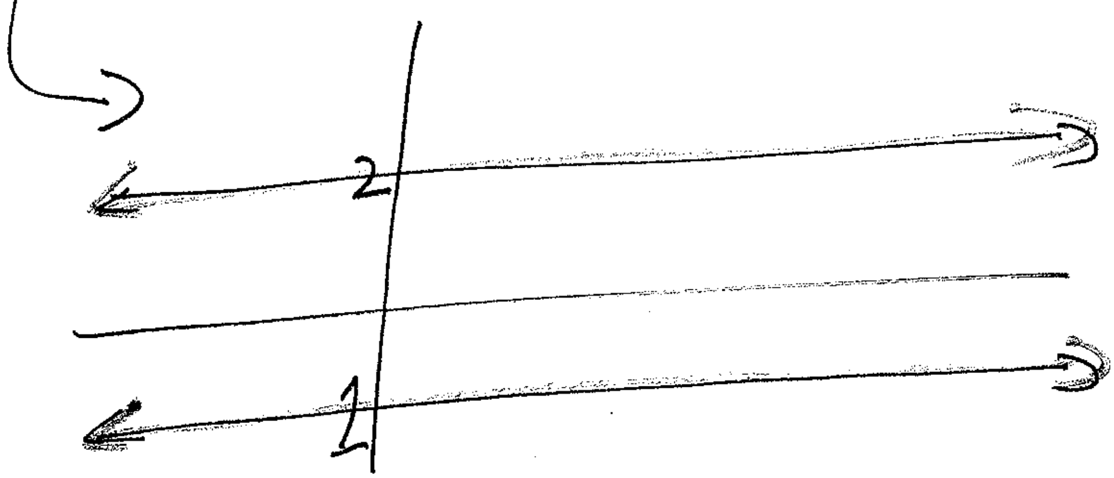
8.3: $y' = f(y)$

autonomous diff eq'n

Ex: $y' = ky$

$y' = (2-y)(y+1)$

$y' = \sin y$



$y' = 0 \Rightarrow y = 2, -1$