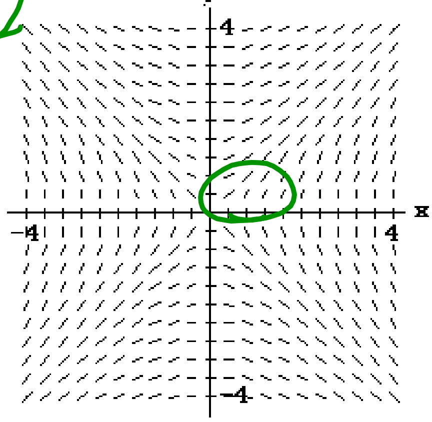
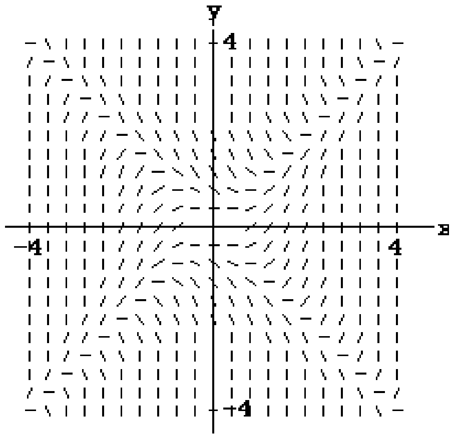
(1,1) $y' = \frac{1}{1} = 1$

1) $y' = \frac{x}{y}$ 1) ________

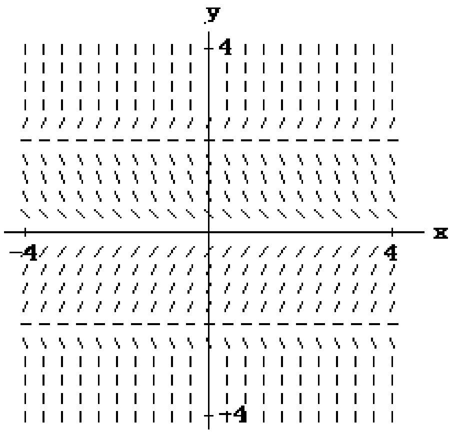
A)



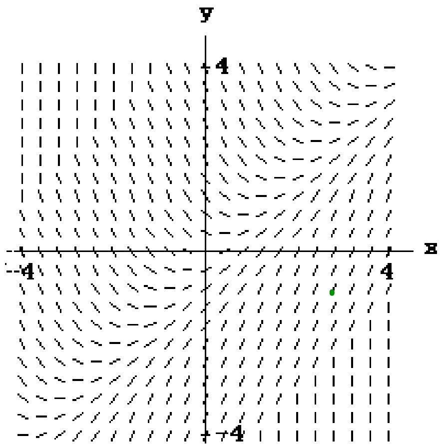
B)



C)



D)



Obtain a slope field and add to its graphs of the solution curves passing through the given points.

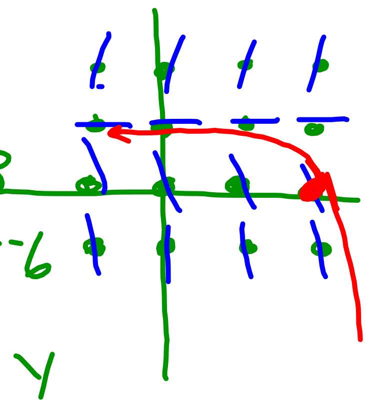
2) $y' = 3(y - 1)$ with $(2, 0)$ 2) ________

$y = 2 \quad 3(1) = 3$

$y = 1 \quad 3(0) = 0$

$y = 0 \quad 3(-1) = -3$

$y = -1 \quad 3(-2) = -6$



If both x & y

(-1,2) . . . .

Evaluate the definite integral by making a u-substitution and integrating from u(a) to u(b).

3) $\int_{\pi/4}^{\pi} \tan x \, dx$ 3) ______________

$$\int_{\pi/4}^{\pi} \tan x \, dx$$

$$\int_{\pi/4}^{\pi} \frac{\sin x}{\cos x} dx$$

$u = \cos x$ — $\cos \pi = -1$, $\cos \pi/4 = \frac{\sqrt{2}}{2}$

$du = -\sin x \, dx$

$-du = \sin x \, dx$

$$-\int_{\frac{\sqrt{2}}{2}}^{-1} \frac{1}{u} du$$

$$-\ln|u| \Big|_{\frac{\sqrt{2}}{2}}^{-1}$$

$$-\left[(\underbrace{\ln 1}_{0}) - \left(\ln \frac{\sqrt{2}}{2}\right)\right]$$

$$+\left[-\ln \frac{\sqrt{2}}{2}\right]$$

$$\boxed{\ln \frac{\sqrt{2}}{2}}$$

4) $\int_0^1 \sqrt{r^2 + 5r}\,(2r + 5)\,dr$ 4) ________

A) $\frac{1}{2\sqrt{6}}$ B) $6\sqrt{6}$ C) $42\sqrt{6}$ D) $4\sqrt{6}$

$u = r^2 + 5r$ $\begin{cases} 1^2 + 5 = 6 \\ 0^2 + 0 = 0 \end{cases}$

$du = 2r + 5\,dr$

$\int_0^6 \sqrt{u}\,du$

$u^{3/2}$

$\sqrt{u^3}$ u·u

$u\sqrt{u}$

$\left.\frac{2u^{3/2}}{3}\right|_0^6$

$\left(\frac{2}{3} \cdot 6\sqrt{6}\right) - \left(\frac{2}{3} \cdot 0\right)$

$4\sqrt{6} - 0$

$\boxed{4\sqrt{6}}$

$\boxed{D}$

5) $\int_{\pi/3}^{2\pi} 3\cos^2 x \sin x \, dx$

$u = \cos x$

$\cos 2\pi = 1$

$\cos \pi/3 = \frac{1}{2}$

$du = -\sin x \, dx$

$-du = \sin x \, dx$

$-\int_{1/2}^{1} 3u^2 \, du$

$-\frac{3u^3}{3}\Big|_{1/2}^{1}$

$-u^3\Big|_{1/2}^{1}$

$(-1) - \left(-\frac{1}{8}\right)$

$-1 + \frac{1}{8}$

$\boxed{-7/8}$

6) $\int_{-1}^{0} \frac{2t}{(4+t^2)^3}\,dt$

A) $-\frac{9}{400}$ B) $-\frac{9}{200}$ C) $\frac{9}{800}$ D) $-\frac{9}{800}$

$u = 4 + t^2$ $4+0=4$ $4+1=5$

$du = 2t\,dt$

$\int_5^4 \frac{1}{u^3}\,du$

u^{-3}

$\frac{u^{-2}}{-2}\Big|_5^4$

$\frac{-1}{2u^2}\Big|_5^4$ ...

$\left(-\frac{1}{32}\right) - \left(-\frac{1}{50}\right)$

$-\frac{1}{32}^{25} + \frac{1}{50}^{14}$

$2\cdot16\cdot25$ $2\cdot25\cdot14$

$CD = \frac{2\cdot16\cdot25}{800}$

$\frac{-25}{800} + \frac{16}{800}$

$\frac{-9}{800}$

7) $\int \csc^4 x\, dx$, $\csc^2 x = 1 + \cot^2 x$

A) $-\cot x + \frac{1}{3}\cot^3 x + C$

B) $-\cot x - \frac{1}{3}\cot^3 x \csc x + C$

C) $-\cot x \csc x - \cot^3 x + C$

D) $-\cot x - \frac{1}{3}\cot^3 x + C$

$$\int \csc^4 x\, dx$$

$\csc^2 x =$
$1 + \cot^2 x$

$$\csc^2 x \underline{\csc^2 x}$$

$$\int \underline{\csc^2 x}\,(1 + \cot^2 x)\,\underline{dx}$$

$u = \cot x$

$du = -\csc^2 x\, dx$

$-du = \csc^2 x\, dx$

$$-\int 1 + u^2 \; du$$

$$\int -1 - u^2 \, du$$

$$-u - \frac{u^3}{3} + C$$

$$-\cot x - \frac{\cot^3 x}{3} + C$$

$\boxed{D}$

Evaluate the integral.

8) $\int \frac{\cos(4\theta + 5)}{\sin^2(4\theta + 5)} d\theta$

$u = \sin(4\theta + 5)$

$\frac{1}{4} du = \frac{4}{4} \cos(4\theta + 5) d\theta$

$\frac{1}{4} du = \cos(4\theta + 5) d\theta$

$\frac{1}{4} \int \frac{1}{u^2} du$

u^{-2}

$\frac{1}{4} \cdot \frac{u^{-1}}{-1} + C$

$\frac{-1}{4u} + C$

$\boxed{\frac{-1}{4\sin(4\theta + 5)} + C}$

9) $\int \tan^5 x \sec^2 x \, dx$

$u = \tan x$

$du = \sec^2 x \, dx$

$\int u^5 \, du$

$\frac{u^6}{6} + C$

$\boxed{\frac{\tan^6 x}{6} + C}$

10) $\int x^3(x^4 - 10)^4 \, dx$

$u = x^4 - 10$

$du = 4x^3 \, dx$

$\frac{1}{4} du = x^3 \, dx$

$\frac{1}{4} \int u^4 \, du$

$\frac{1}{4} \frac{u^5}{5} + C$

$\frac{u^5}{20} + C$

$$\boxed{\frac{(x^4 - 10)^5}{20} + C}$$

11) $\int \left(9t^2 - 5\sin t\right)dt$

$$\frac{9t^3}{3} + 5\cos t + c$$

$$3t^3 + 5\cos t + c$$