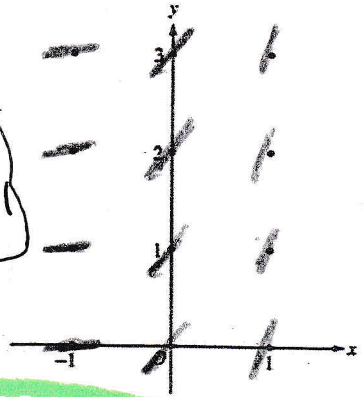
Practice Quiz 3/27 Calculus

Consider the differential equation $\frac{dy}{dx} = x + 1$

a. On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.



$\boxed{F(x) = \frac{1}{2}x^2 + x + 1}$

$\int x + 1 \, dx$

$y = \frac{1}{2}x^2 + x + C$

$1 = 0 + 0 + C$

$1 = C$

b. While the slope field in part a is drawn at only twelve points, it is defined at every point in the xy-plane. Describe all points in the xy-plane for which the slopes are negative.

$x < -1$

c. Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 1$

Solve the initial value problem using the F.T.C.
Your answer will contain a definite integral

$\frac{dy}{dx} = e^{\cos x}$ and when $x = 2$ $y = 9$

$\boxed{\int_2^x e^{\cos x} dx + 9}$

Evaluate these integrals
Other Sheet

1) $\int (2x+3)\, dx$

4) $\int -\sin(x) e^{\cos x} \, dx$

2) $\int_0^{10} \frac{dx}{x+3}$

5) $\int_0^1 \frac{1}{x^2+1} \, dx$

3) $\int \frac{\cos x}{2 + 5\sin x} \, dx$

6) $\int_1^e \frac{\sqrt{\ln r}}{r} \, dr$

1. $\int 2x+3\,dx$

$\boxed{F(x) = x^2 + 3x + C}$

$-\int$

4. $u = \cos x$

$du = -\sin x\,dx$

$\int e^u\,du$

$\boxed{e^{\cos x} + C}$

2. $\int_0^{10} \frac{dx}{x+3}$ $\quad \ln|x+3| \Big|_0^{10}$

$\ln 13 - \ln 3$

$\boxed{\ln \frac{13}{3}}$

5. $\int_0^1 \frac{1}{x^2+1}\,dx$ $\quad \arctan x \Big|_0^1$

$\arctan 1 - \arctan 0$

$\boxed{\frac{\pi}{4}}$

3. $\int \frac{\cos x}{2+\sin x}\,dx$

$u = 2+\sin x$

$du = \cos x\,dx$

$\int \frac{1}{u}\,du$ $\quad \ln|2+\sin x| + C$

6) $\int_1^e \frac{\sqrt{\ln r}}{r}\, dr$ $u = \ln r$
$du = \frac{1}{r} dr$

$\sqrt{\ln r} \cdot \frac{1}{r} \cdot dr$ $u(e) = \ln e = 1$

$u(1) = \ln 1 = 0$

$\int_0^1 \sqrt{u}\, du$ $u^{\frac{1}{2}} \to \frac{2}{3} u^{\frac{3}{2}} \Big|_0^1$

$\boxed{\frac{2}{3}} - 0$