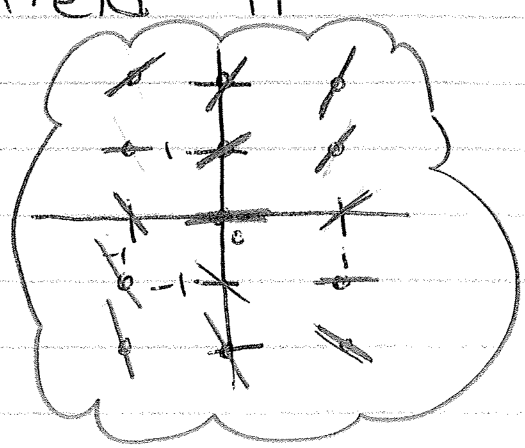
Quiz Review 6.1 - 6.2

① $\int (x^4 - x^{-2} + \sin x - \csc^2 x + e^x)\,dx$

$\frac{x^5}{5} + \frac{1}{x} - \cos x + \cot x + e^x + C$

② Construct a slope field if $\frac{dy}{dx} = x + y$



$(0,0)$ $m=0$	$(0,2)$ $m=2$
$(0,1)$ $m=1$	$(-1,0)$ $m=-1$
$(1,0)$ $m=1$	$(-1,-1)$ $m=-2$
$(1,1)$ $m=2$	etc
$(1,3)$ $m=4$	

③ What is the solution to the differential equation $\frac{dy}{dx} = 2e^x - \cos x$ and $y = 3$, when $x = 0$?

$\int (2e^x - \cos x)\,dx$

$y = 2e^x - \sin x + C$

$3 = 2e^0 - \sin 0 + C$

$3 = 2 - 0 + C$

$1 = C$

$2e^x - \sin x + 1$

④ $\int_0^1 \left(x^2\sqrt{5+2x^3}\right)dx$

$u = 5 + 2x^3$

$\frac{du}{dx} = 6x^2$

$du = 6x^2\,dx$

$\frac{1}{6}du = x^2\,dx$

$\frac{1}{6}\int \sqrt{u}\,du = \frac{1}{6}\int u^{1/2}\,du = \frac{1}{6}u^{3/2}\cdot\frac{2}{3} = \frac{1}{9}(5+2x^3)^{3/2}\Big|_0^1$

$= \frac{1}{9}(7)^{3/2} - \frac{1}{9}(5)^{3/2} = .81554$

⑤ $\int \tan(4x+2)\,dx = \int \frac{\sin(4x+2)}{\cos(4x+2)}dx$

$u = \cos(4x+2)$

$du = -4\sin(4x+2)$

$-\frac{1}{4}du = \sin(4x+2)$

$-\frac{1}{4}\int \frac{1}{u}du = -\frac{1}{4}\ln|u| + C$

$-\frac{1}{4}\ln|\cos(4x+2)| + C$

⑥ $\int_{\pi/4}^{3\pi/4} \cot x\,dx = \int \frac{\cos x}{\sin x}dx$ $\quad u = \sin x$ $\quad du = \cos x\,dx$

$= \int \frac{1}{u}du = \ln|u| = \ln|\sin x|\Big|_{\pi/4}^{3\pi/4} = \ln\left|\sin\frac{3\pi}{4}\right| - \ln\left|\sin\frac{\pi}{4}\right|$

$= \ln\frac{\sqrt{2}}{2} - \ln\frac{\sqrt{2}}{2}$

$= \ln\frac{\sqrt{2}/2}{\frac{\sqrt{2}}{2}} = \ln 1 = 0$

⑦ $\int_0^2 \frac{e^x}{3+e^x}dx = \int \frac{1}{u}du$

$= \ln|u| = \ln|3+e^x|\Big|_0^2$

$u = 3+e^x$

$du = e^x dx$

$= \ln|3+e^2| - \ln|4| = \ln\left|\frac{3+e^2}{4}\right|$

$\boxed{=.954459}$

⑧ $\int \frac{2t-3}{(t^2-3t+1)^2}dt$

$u = t^2-3t+1$

$du = (2t-3)dt$

$\int \frac{1}{u^2}du = \int u^{-2}du = \frac{u^{-1}}{-1} + C$

$\boxed{\frac{-1}{u} + C} = \boxed{\frac{-1}{2t-3} + C}$