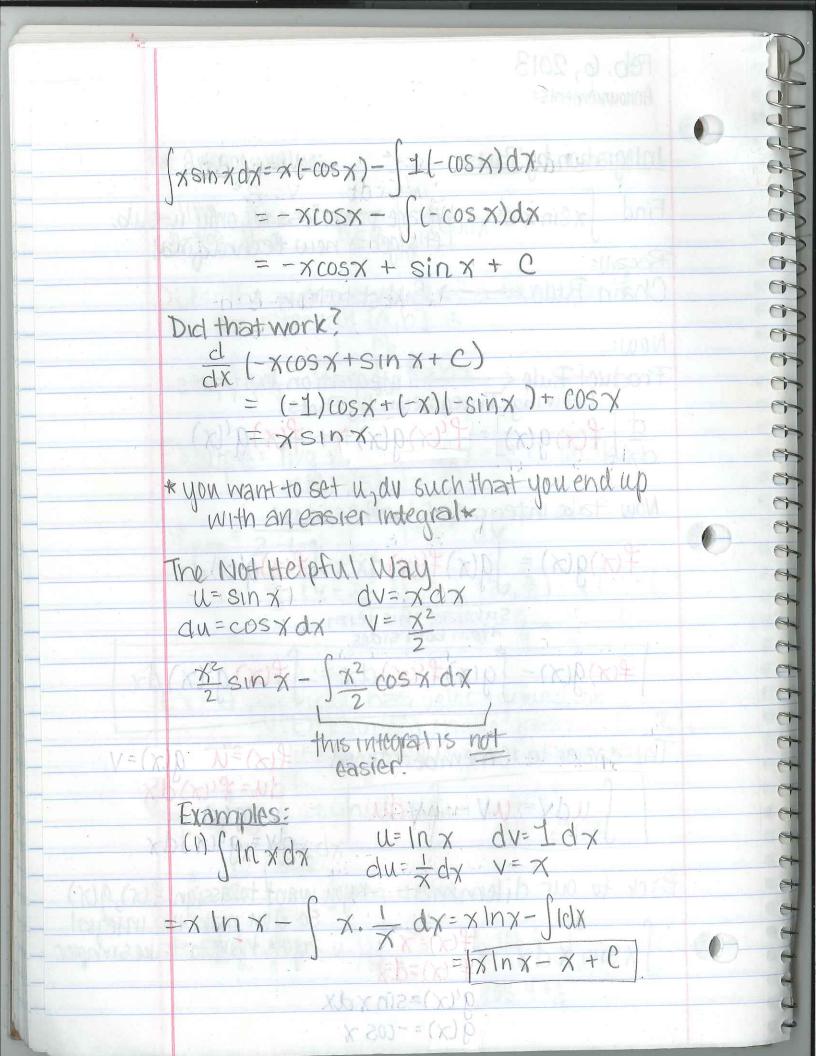
Feb. 6, 2013 Announcements: Integration by Parts Find Jxsinxdx. We are powerless w/ only u-sub. Let's get a new technique! Recall: Chain Rule -> Substitution NOW: Product Rule > Integration by parts

Deriving Integration by Parts:

d[f(x)g(x)] = .g(x)f'(x) + f(x)g'(x) Now take integral of both sides:  $f(x)g(x) = \left[ g(x)f'(x)dx + \int f(x)g'(x)dx \right]$ Subtract this term from both sides +(x)q(x) - (q(x)+(x)dx = (+(x)q(x)dx The easier to remember form : U= \$(x) du=f(x)dx  $udv = uv - \int vdu \qquad v = g(x) dx$  clv = g'(x) dxBack to our dilemma: \*you want to assign fix), g(x)
so you make the integral
you have to take simpler. xsin xdx u=x du=dx dy = sin x dx V = - COS X



(2)  $\int t^2 e^t dt$   $\int u dt = e^t dt$   $\int u dt = e^t dt$ = t2et - (2tet dt = Still can4 take the integral. Use integration by parts again!  $= t^2 e^t - [2te^t - [2e^t dt]]$ = t2et - 2tet + 2et + C (3)  $\int e^{x} \sin x \, dx$   $u=e^{x}$   $dv=\sin x \, dy$   $du=e^{x} dx$   $v=-\cos x$  $= -e^{x}\cos x - \left[-e^{x}\cos x \, dx\right]$ = -excosx+ gexcosxdx u=ex dv=cosxdx du-exdx V= Sin x = - excosx + exsinx - fexsin xdx Where are we at? exsinx dx=-excosx+exsinx-fexsinxdx Solve for the integral. 2 / exsinxdx=-excosx+exsinx | exsmxdx= -excosx+exsinx +c