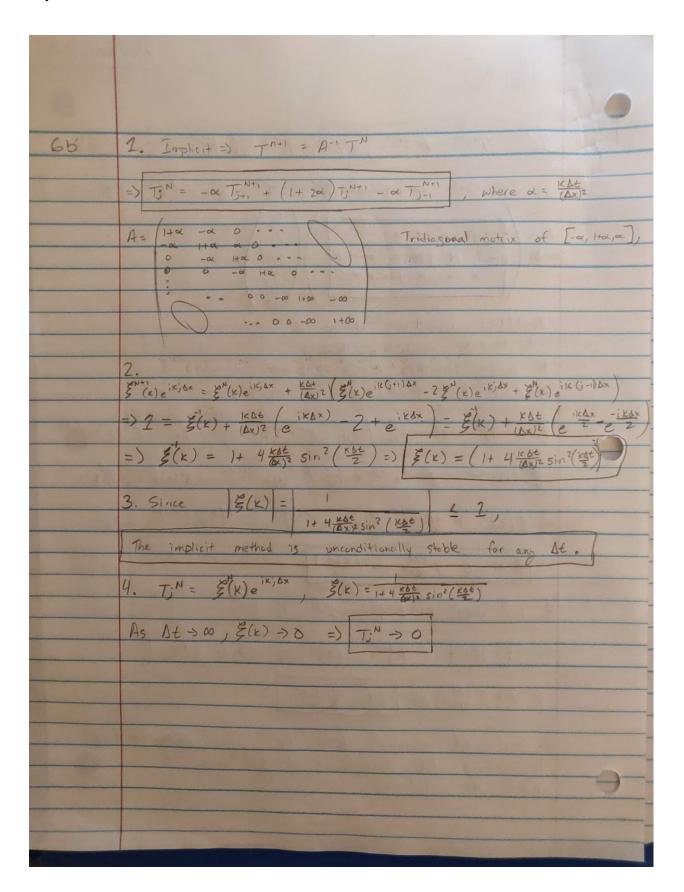
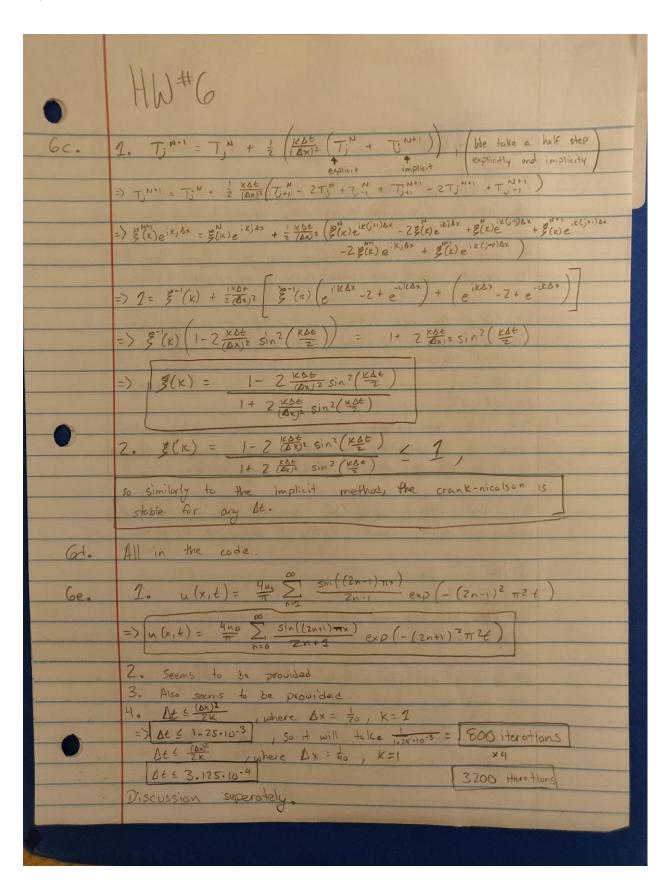
	HW#C
Ga	1. $T^{n+1} = AT^n$, $T_j^{n+1} = T_j^{n} + \frac{k\Delta t}{(\Delta x)^2} \left(T_{j+1}^n - 2T_j^n + T_{j-1}^n\right)$ In lecture we set $d = \frac{k^2\Delta t}{(\Delta x)^2} = T_j^{n+1} = T_j + \alpha \left(T_{j+1}^n - 2T_j^n + T_{j-1}^n\right)$
	A = / 0 0 1 - 20 0 0 0 Ton Tin Tin
	First/Last rows of cols can charge due to boundary conditions. Ignoring
	the boundary conditions, A is a tridiagnal motive of [x, 1-2x, x] 2. Tinti = Tinti = Tinti = KAt (Tin - Zint + Tin) , Tin = Kin (k)eikjax
	$\xi^{N''}(k)e^{ikj\delta x} = \xi^{N}(k)e^{ikj\delta x} + \frac{k\delta t}{(\delta x)^{2}} \left(\xi^{N}(k)e^{ik(j+1)\delta x} - 2 \xi^{N}(k)e^{ikj\delta x} + \xi^{N}(k)e^{ik(j+1)\delta x} \right)$ $= \sum_{k=1}^{\infty} \xi(k) = 1 + \frac{k\delta t}{(\delta x)^{2}} \left(e^{ik\delta t} - 2t e^{-ik\delta t} \right) + \frac{(e^{ix} + e^{-ix})^{2}}{2i} = \sin^{2}(x)$
	$=) \left[\xi(\kappa) = 2 - 4 \frac{\kappa \Delta t}{(\Delta \kappa)^2} \sin^2(\frac{\kappa \Delta t}{2}) \right]$
	3. We need $\sin^2\left(\frac{K\Delta t}{2}\right) = 1$ $= 1 \ge \left \frac{2}{3}(\kappa)\right = 1 - 4\frac{K\Delta t}{(\Delta x)^2} \sin^2\left(\frac{K\Delta x}{2}\right) \Rightarrow 1 \ge 11 - 4\frac{K\Delta t}{(\Delta x)^2}$
	4. Since Δt correlates with $(\Delta x)^2$, you would need to reduce Δt by a factor of 4 in order to double the resolution.
0	double the resolution.





	J=20 Acs vs implicit us. CN
	£=1.25×10-3
	For ftcs, the rms difference increases linearly with time
	to about -5.5. Results are very similar to the analytical results.
	1 11 0
	For implicit, the oms difference increases slower than fits
	to about -404, with similar results to the analytical solution.
	For CN, the rms difference increases at a rate between
	Acs and implicit to about 406, with similar results to the
	analytical solution.
	J=40
	t=1.25 x10-3
	For Acs, the method does not produce useful results
	since it is unstable, since we doubled I, we would need to divide At by a factor of 4 to stay stable.
	To divide Do go mais of the original
	Both the implicit and CN similarly ran with the rms
	difference being about - 4.5, but with twice the spatial points.
	J=40
	t= 3.125.10-4
	For fles, the rms error increases linearly over time to
	about - E. Results are very similar to the analytical solution o
	The implicit and CN methods ran very similarly with
	oms differences about -5.
	On these malkeds and I
	All three methods produced sesults very similes to analytical results.
	analytical 1000 to.
-	