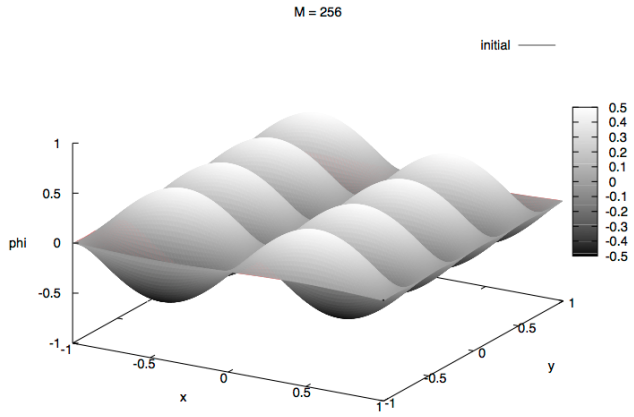
Homework 5 Solution

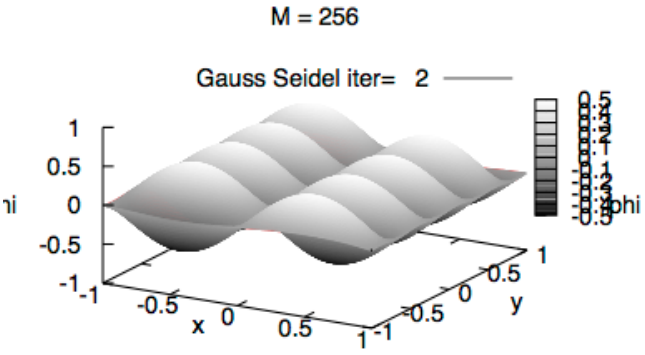
Problem 1 (40 points total; AEE471: +10 bonus points for V-cycle instead of dualgrid)

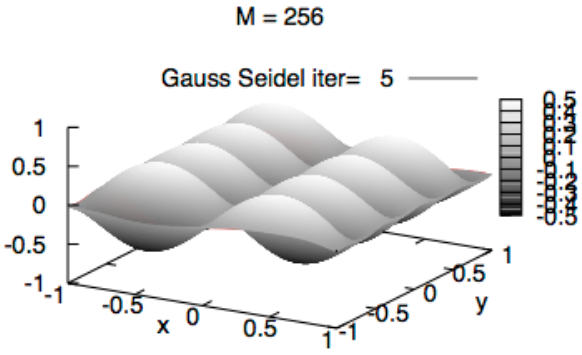
Deductions:
- no SafeAssign code upload: -20pts
- no printout: -20pts
- not using all requested input quantities: -10pts

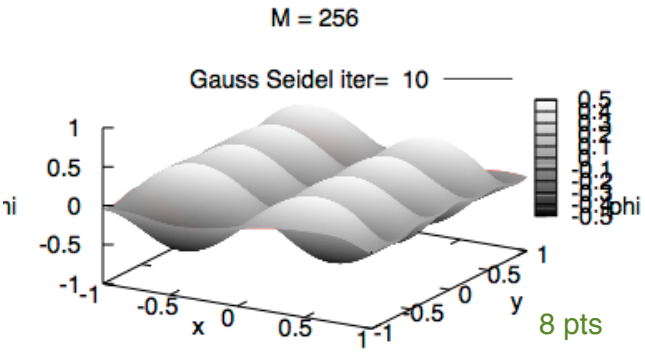
Problem 2 (60 points total)



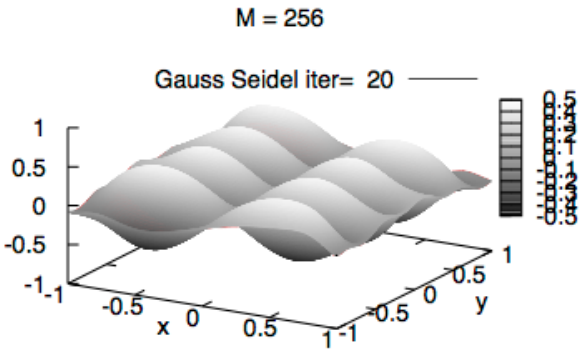
1 pt







8 pts



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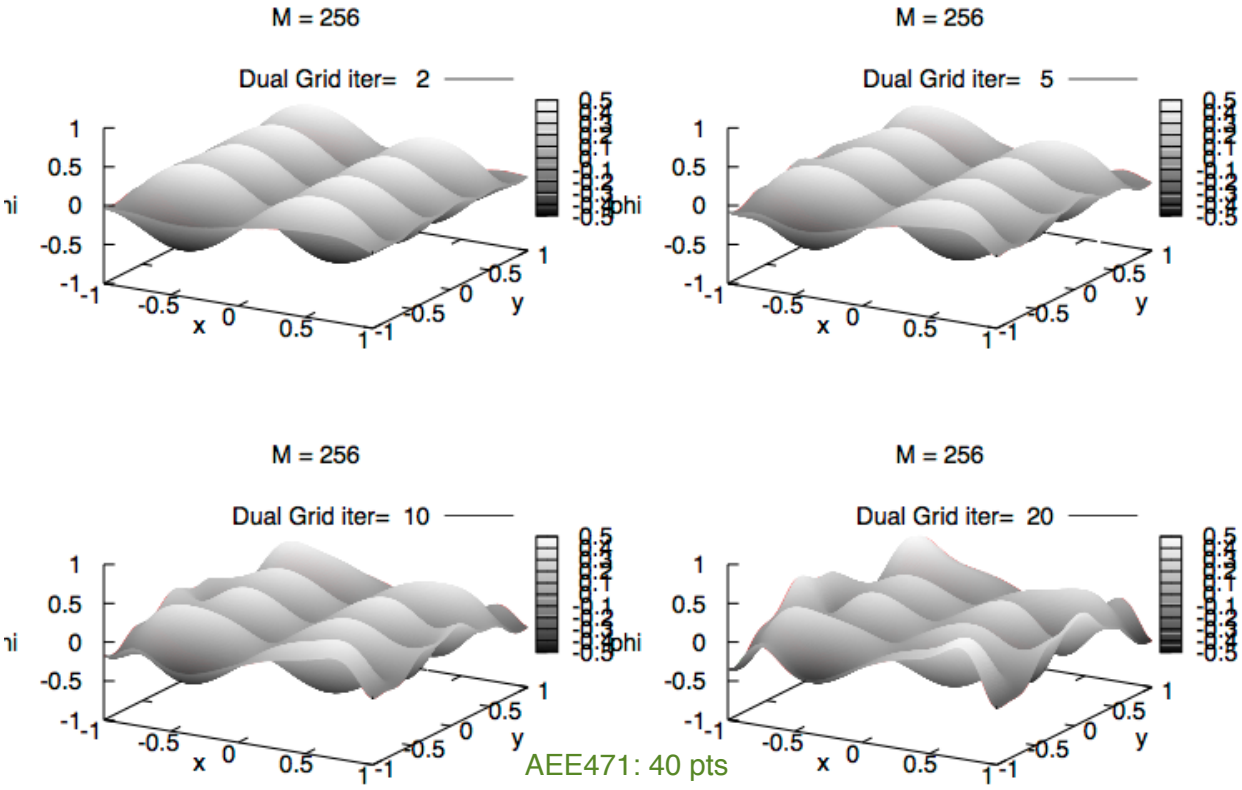
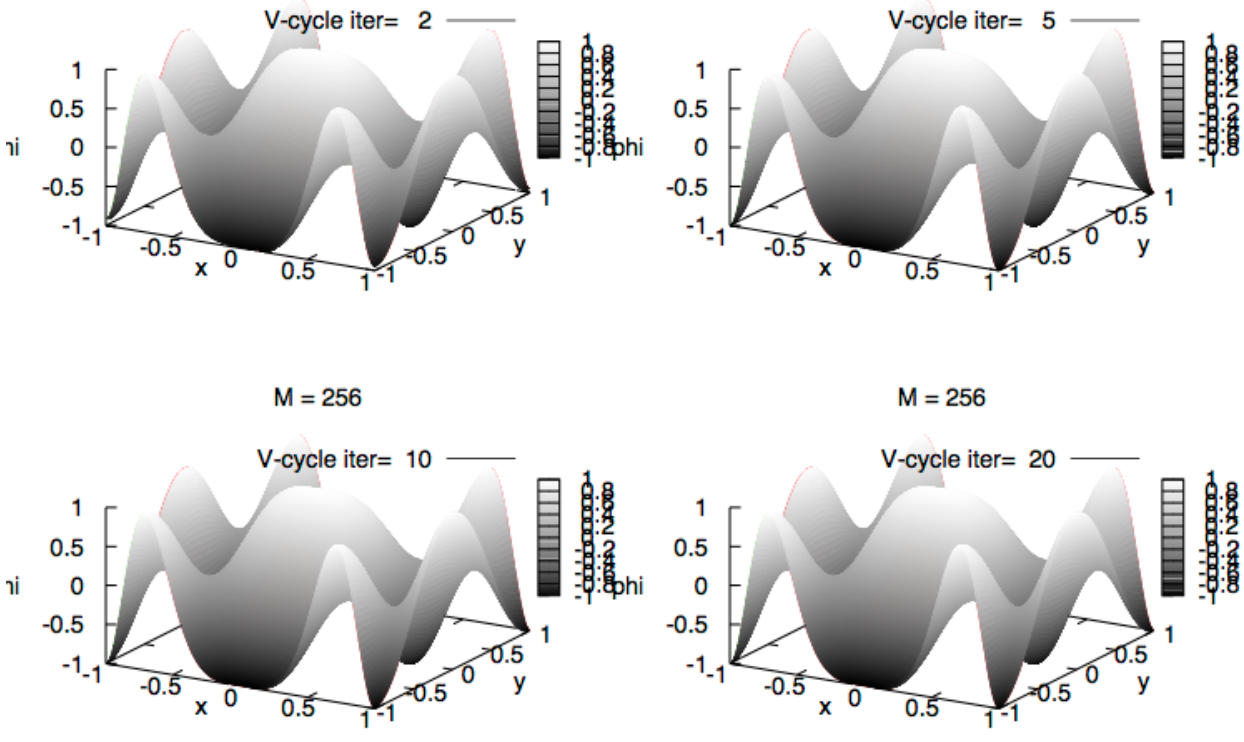


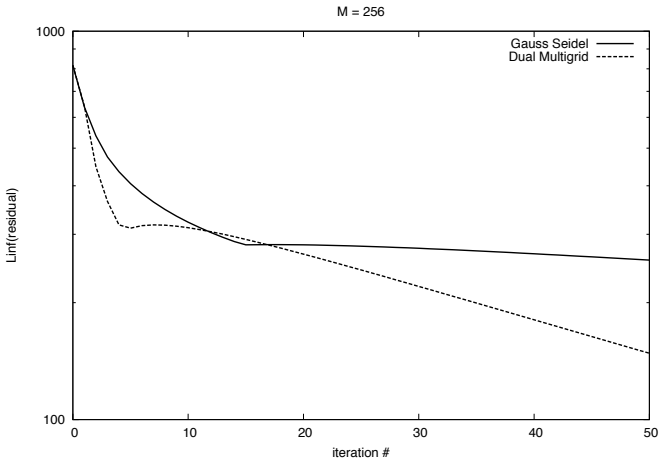
AEE471: 40 pts

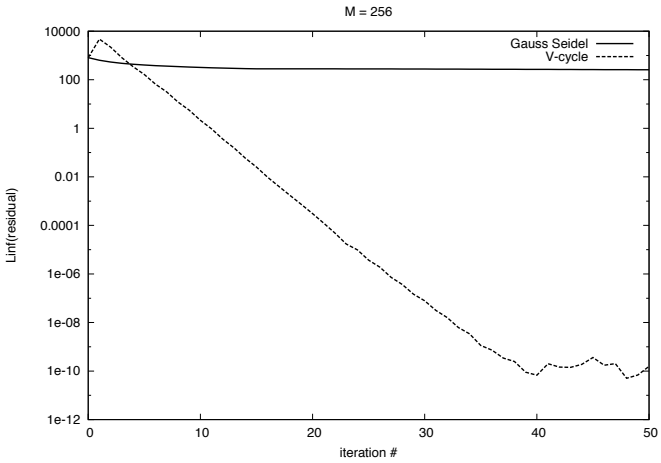
or



MAE561 or AEE471 V: 40 pts

Homework 5 Solution





AEE471: 10 pts or MAE561 or AEE471 V: 10 pts

Discussion:
- multigrid converges faster than Gauss Seidel; V-cycle reaches finite precision limit (1 point)

Deductions:
- if wrong right hand side: -20pts

Bonus Problem 3 (10 points total)
(using for example 50 iterations of V-cycle) 2 pts

M-x	Linf	L1	L2	order Linf	order L1	order L2
64	1.45265E-01	2.24256E-02	3.95025E-02			
128	3.64149E-02	5.59628E-03	9.84005E-03	1.9961	2.0026	2.0052
256	9.09037E-03	1.39717E-03	2.45782E-03	2.0021	2.0020	2.0013
512	2.27417E-03	3.49197E-04	6.14319E-04	1.9990	2.0004	2.0003
1024	5.68638E-04	8.72976E-05	1.53571E-04	1.9998	2.0000	2.0001
2048	1.42165E-04	2.18239E-05	3.83923E-05	1.9999	2.0000	2.0000

4 pts

M-y	Linf	L1	L2	order Linf	order L1	order L2
64	2.51701E-02	5.17723E-03	8.00216E-03			
128	6.29872E-03	1.28486E-03	1.98886E-03	1.9986	2.0106	2.0084
256	1.57427E-03	3.21063E-04	4.96487E-04	2.0004	2.0007	2.0021
512	3.93445E-04	8.02301E-05	1.24076E-04	2.0004	2.0006	2.0005
1024	9.83556E-05	2.00556E-05	3.10162E-05	2.0001	2.0001	2.0001
2048	2.45883E-05	5.01384E-06	7.75388E-06	2.0000	2.0000	2.0000

4 pts

need not have all of the above grid levels, but should have at least 3 of them