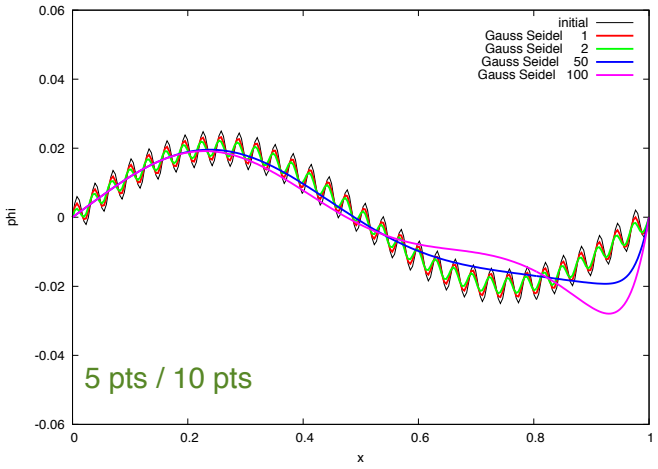
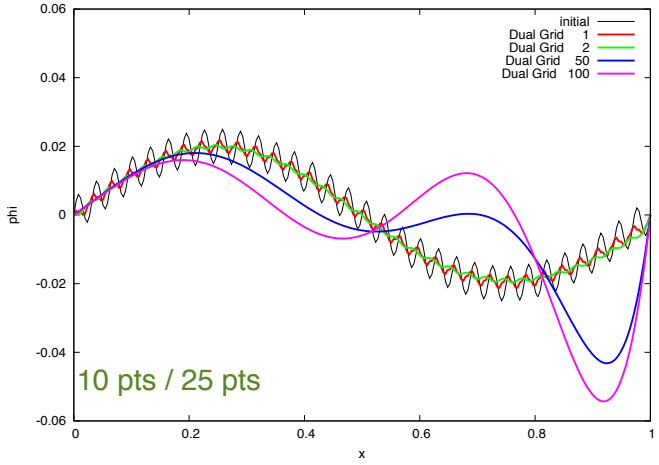
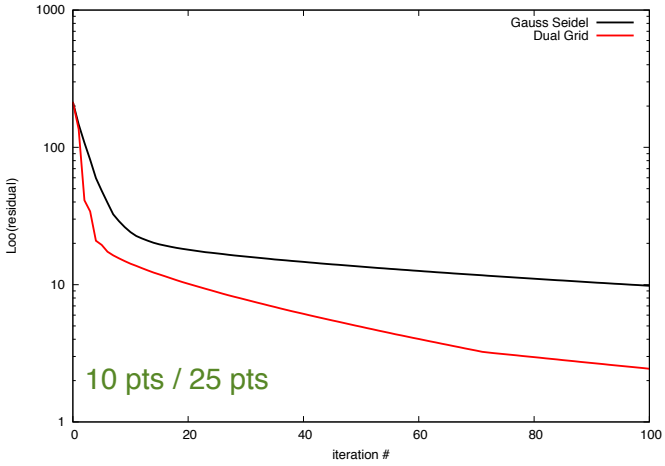
Homework 4 Solution

Problem 1 (MAE561: 40 points total; AEE471: 100 points total)







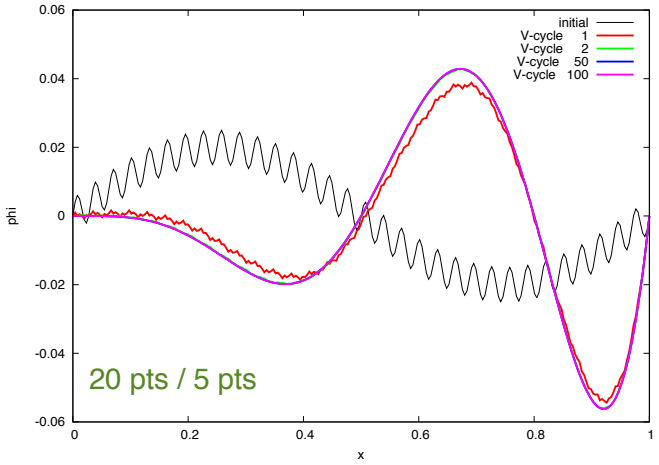
Code: 10pts / 30pts

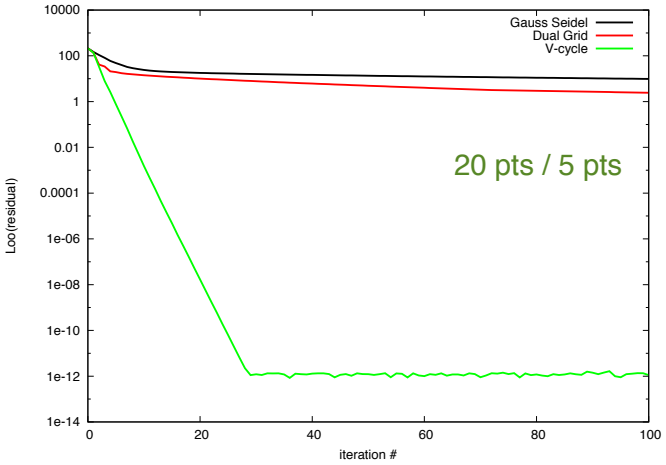
Discussion:
- Dual grid converges faster than Gauss Seidel, Point Jacobi and SOR within the first 100 iterations (3 points / 6 points)
- Dual grid has lower cost than the aforementioned 3 other methods (2 points / 4 points)

Deductions:
- no SafeAssign code upload: -20pts/-50pts
- if wrong right hand side: -15pts/-30pts

Homework 4 Solution

Problem 2 (MAE561: 60 points total; AEE471: 20 bonus points)





Code: 15pts / 7pts

Discussion:
- V cycle converges significantly faster than either Dual grid, Gauss Seidel, Point Jacobi or SOR within the first 100 iterations (2 points / 1 point)
- V-cycle reaches machine precision convergence around 20-30 iterations (2 points / 1 point)
- V-cycle converges faster at lower cost than all the other 4 methods (1 point / 1 point)

Deductions:
- no SafeAssign code upload: -30pts/-10pts
- if wrong right hand side: -20pts/-10pts

Bonus Problem 3 (10 points total)
(using for example 100 iterations of V-cycle)

8 pts

M	Linf	L1	L2	order Linf	order L1	order L2
128	1.21412E-04	5.55035E-05	6.69246E-05			
256	3.03473E-05	1.39279E-05	1.67607E-05	2.0003	1.9946	1.9975
512	7.58656E-06	3.48863E-06	4.19406E-06	2.0000	1.9972	1.9987
1024	1.89664E-06	8.73000E-07	1.04901E-06	2.0000	1.9986	1.9993

Discussion:
- formal order of 2 is observed for all norms, since the convergence error after 100 V-cycle iterations is at machine precision, leaving only the truncation error (2 pts)