MATH610-600

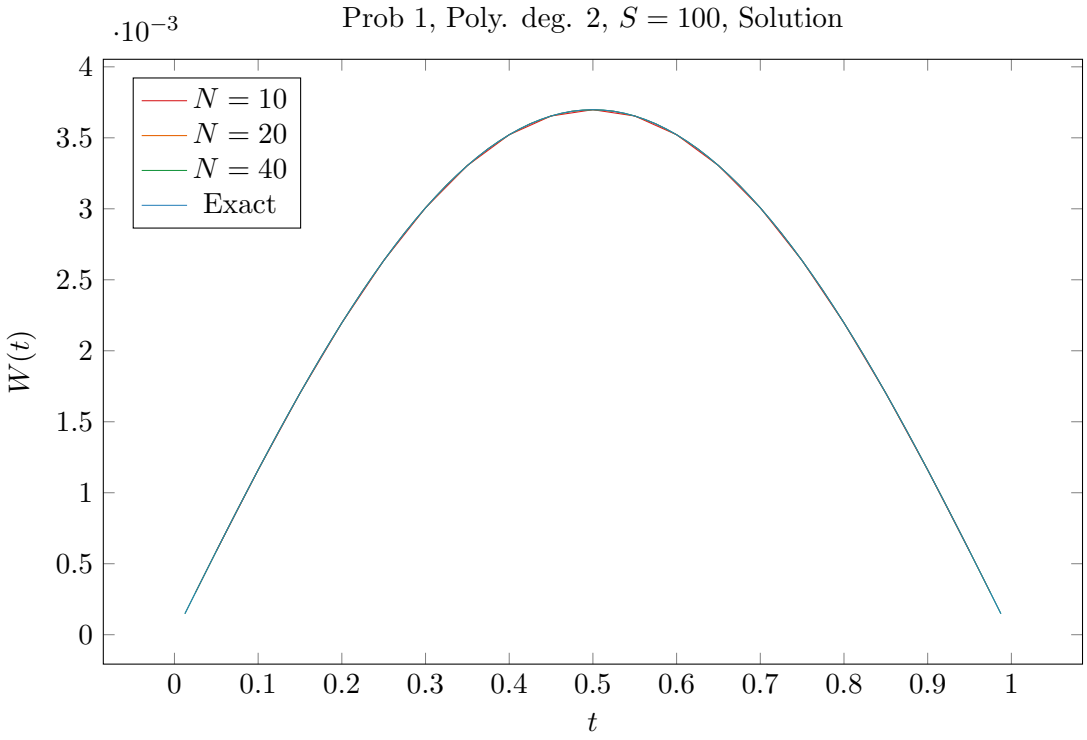
Programming Assignment #3

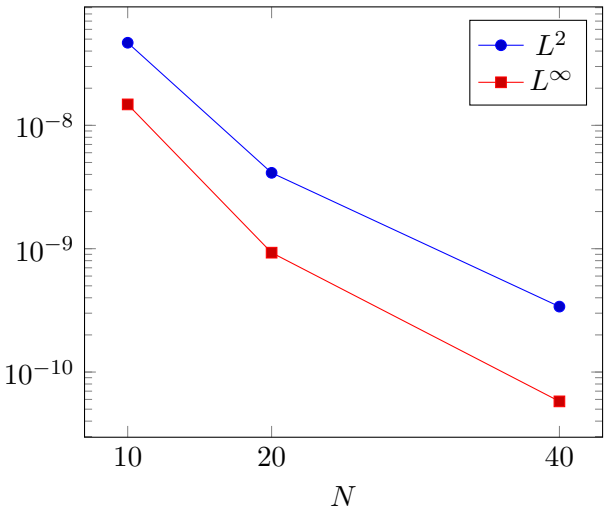
October 13, 2016

Sam Friedman

1 Results

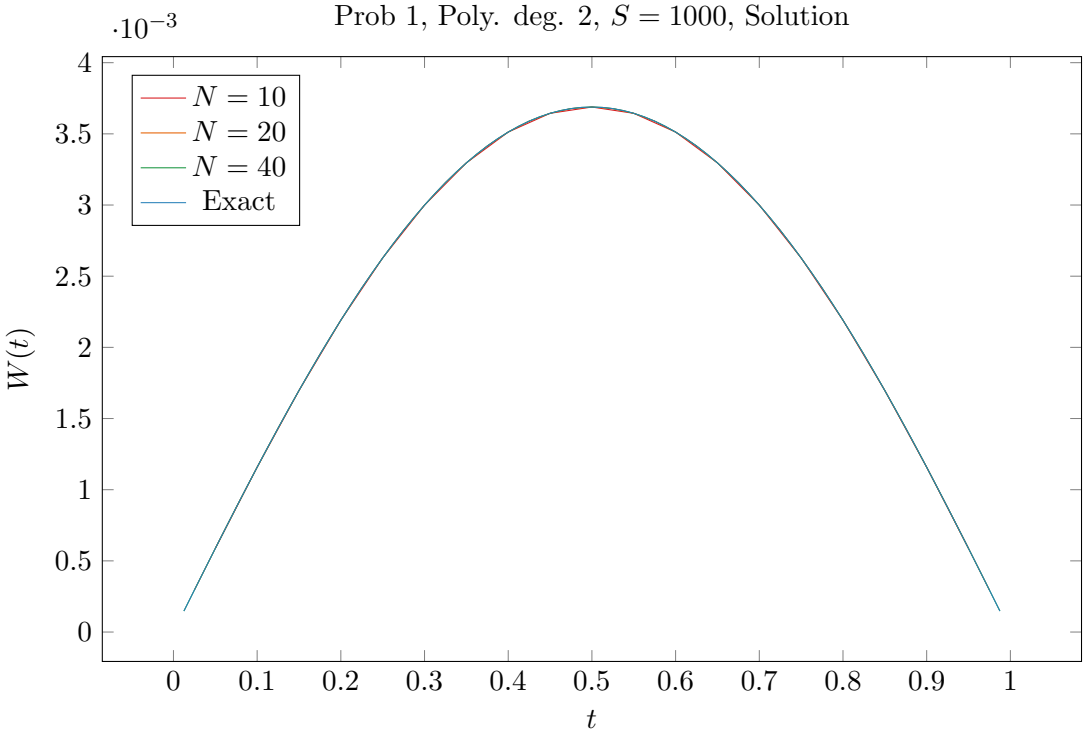
Problem 1

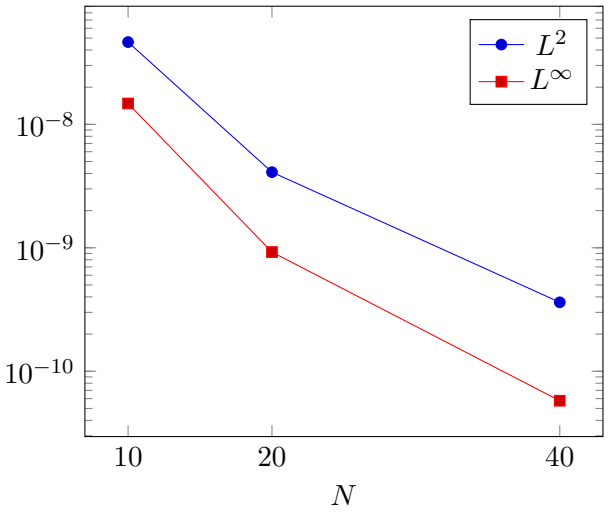




Prob. 1, Poly. deg. 2, $S = 100$ Error Norms

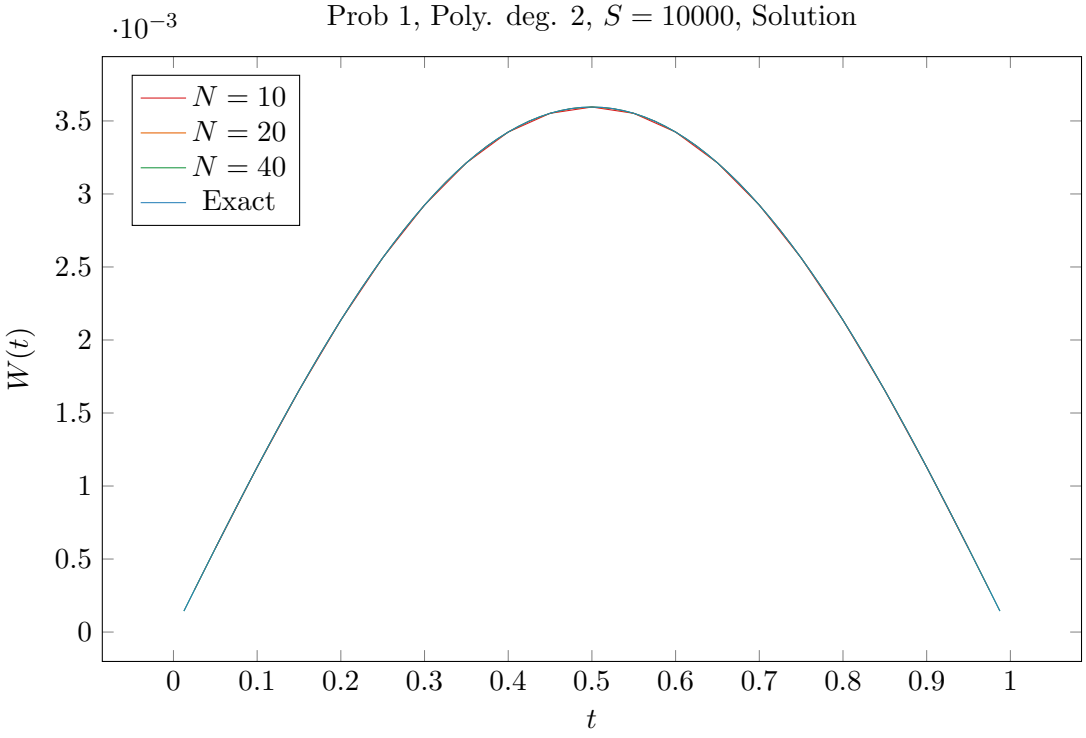
N	L^2	L^∞	H^1
10	$4.67366621e{-8}$	$1.47865030e{-8}$	$1.16658152e{-13}$
20	$4.12190887e{-9}$	$9.28396026e{-10}$	$1.82475355e{-15}$
40	$3.39225347e{-10}$	$5.78407244e{-11}$	$2.67815518e{-17}$

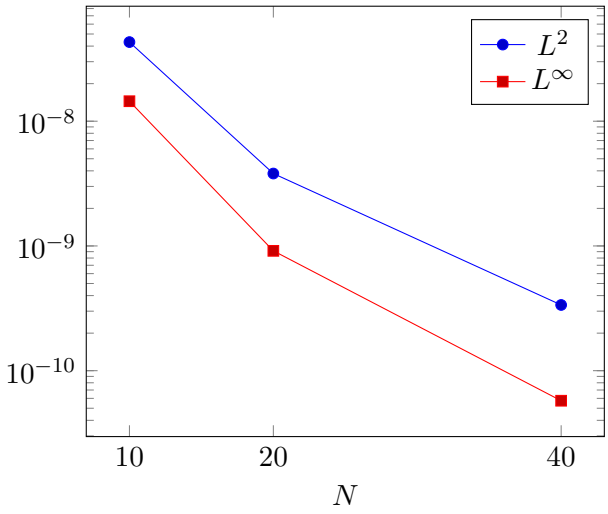




Prob. 1, Poly. deg. 2, $S = 1000$ Error Norms

N	L^2	L^∞	H^1
10	$4.63895200e{-8}$	$1.47611634e{-8}$	$1.16213773e{-13}$
20	$4.09976514e{-9}$	$9.23518535e{-10}$	$1.81582307e{-15}$
40	$3.61930065e{-10}$	$5.77185102e{-11}$	$2.83857269e{-17}$

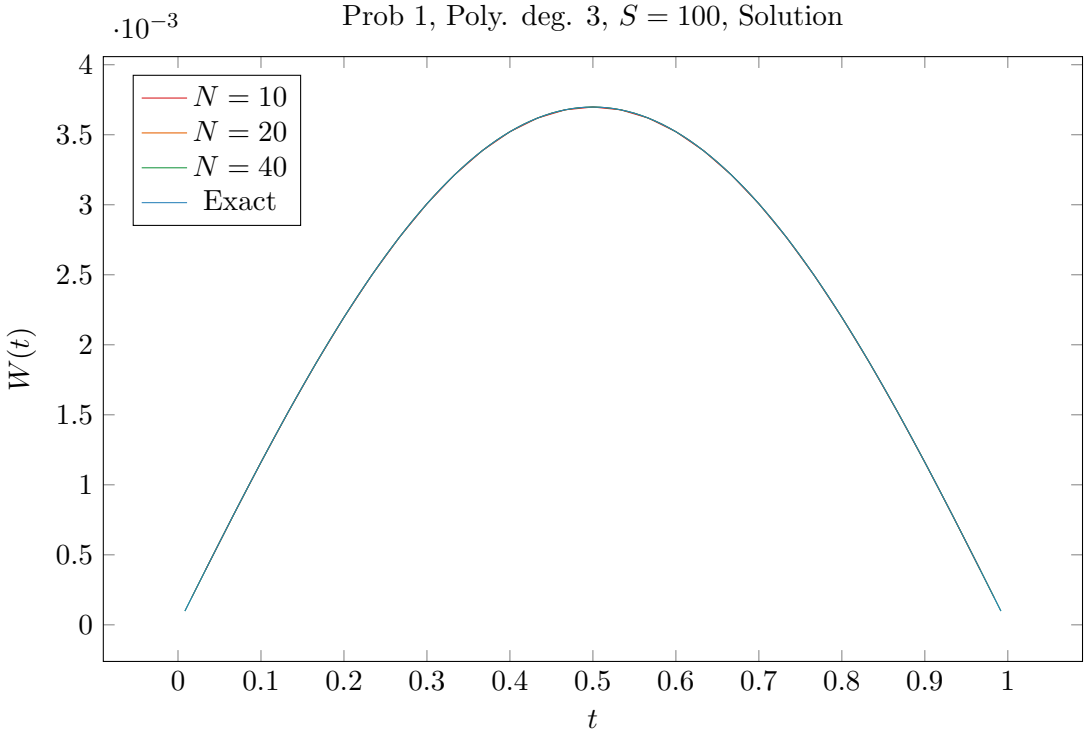




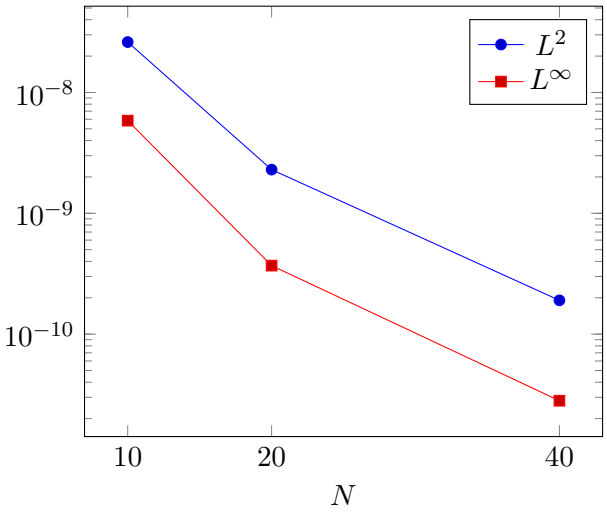
Prob. 1, Poly. deg. 2, $S = 10000$ Error Norms

N	L^2	L^∞	H^1
10	$4.30828785e{-8}$	$1.44585986e{-8}$	$1.11466423e{-13}$
20	$3.80673666e{-9}$	$9.13715208e{-10}$	$1.74162012e{-15}$
40	$3.36441269e{-10}$	$5.74458379e{-11}$	$2.72126591e{-17}$

Prob 1, Poly. deg. 3, $S = 100$, Solution

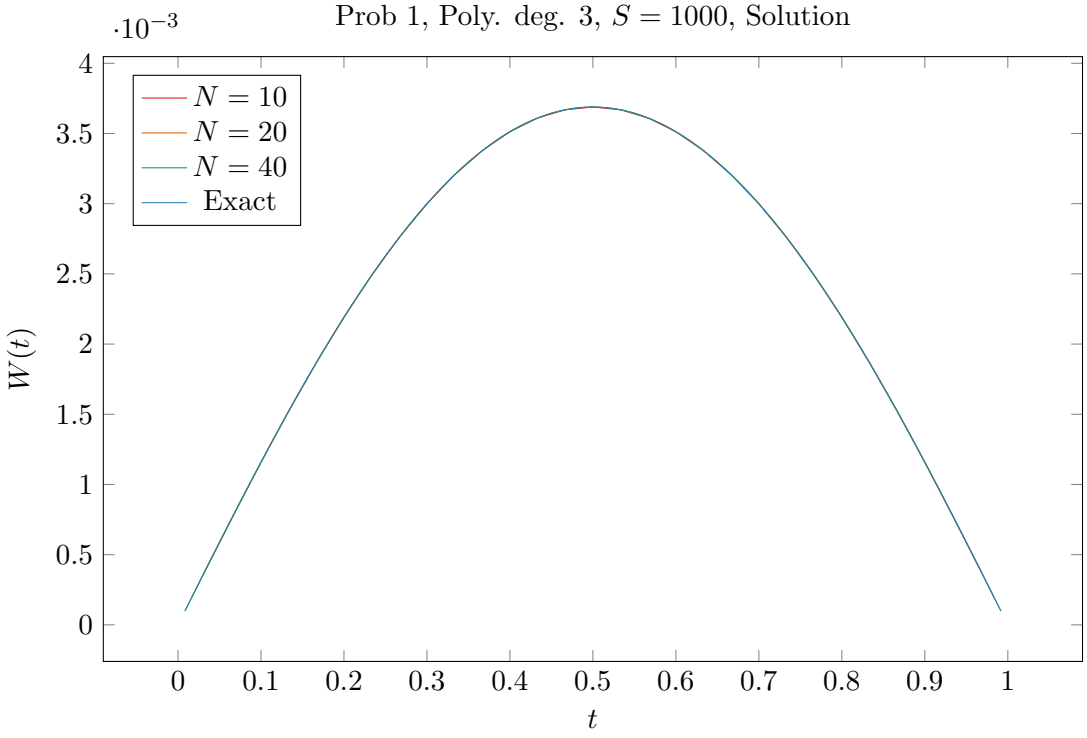


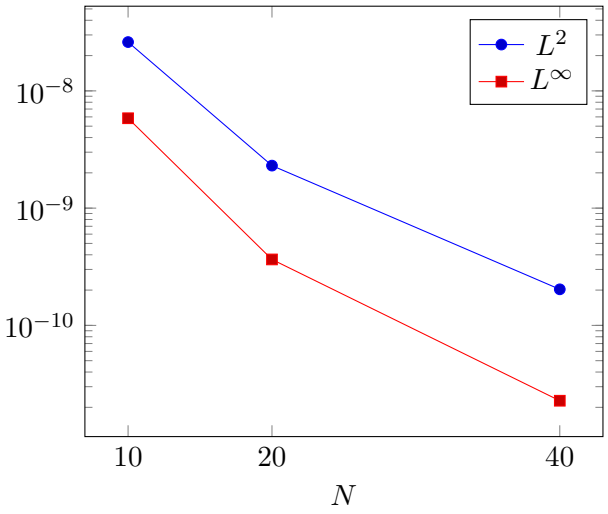
Prob 1, Poly. deg. 3, $S = 100$, Error Norms



Prob. 1, Poly. deg. 3, $S = 100$ Error Norms

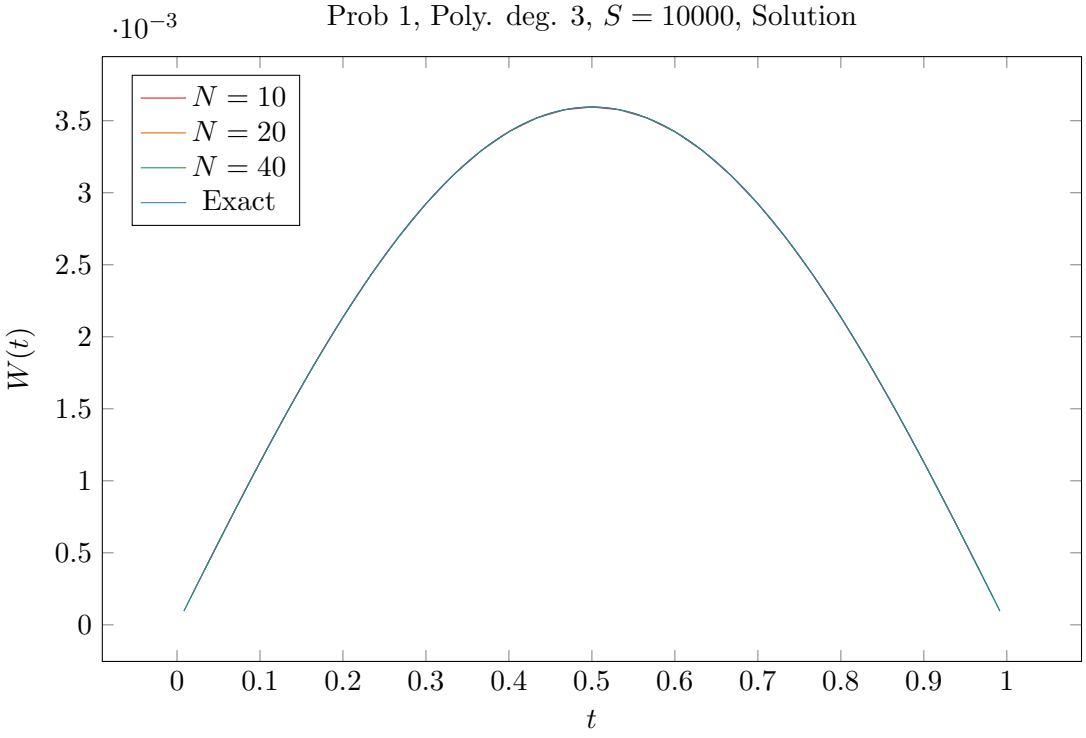
N	L^2	L^∞	H^1
10	$2.61306271e{-8}$	$5.84840497e{-9}$	$2.30570561e{-14}$
20	$2.29854141e{-9}$	$3.69194360e{-10}$	$3.62386529e{-16}$
40	$1.90427839e{-10}$	$2.81257999e{-11}$	$6.44034289e{-18}$

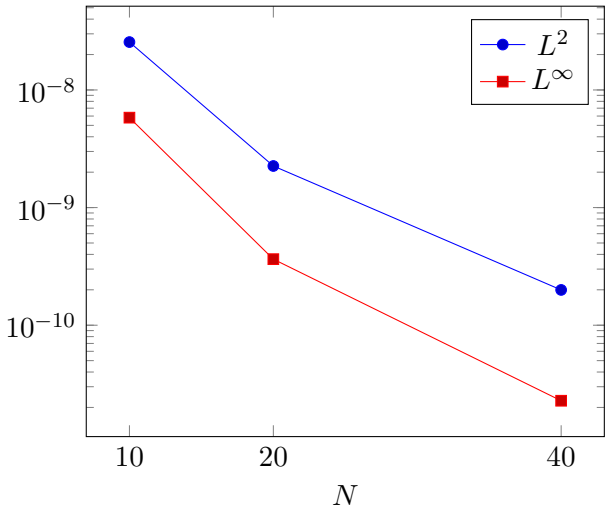




Prob. 1, Poly. deg. 3, $S = 1000$ Error Norms

N	L^2	L^∞	H^1
10	$2.60791292e{-8}$	$5.84230899e{-9}$	$2.29555266e{-14}$
20	$2.30462872e{-9}$	$3.65131930e{-10}$	$3.58693889e{-16}$
40	$2.03033783e{-10}$	$2.27722145e{-11}$	$5.61131586e{-18}$

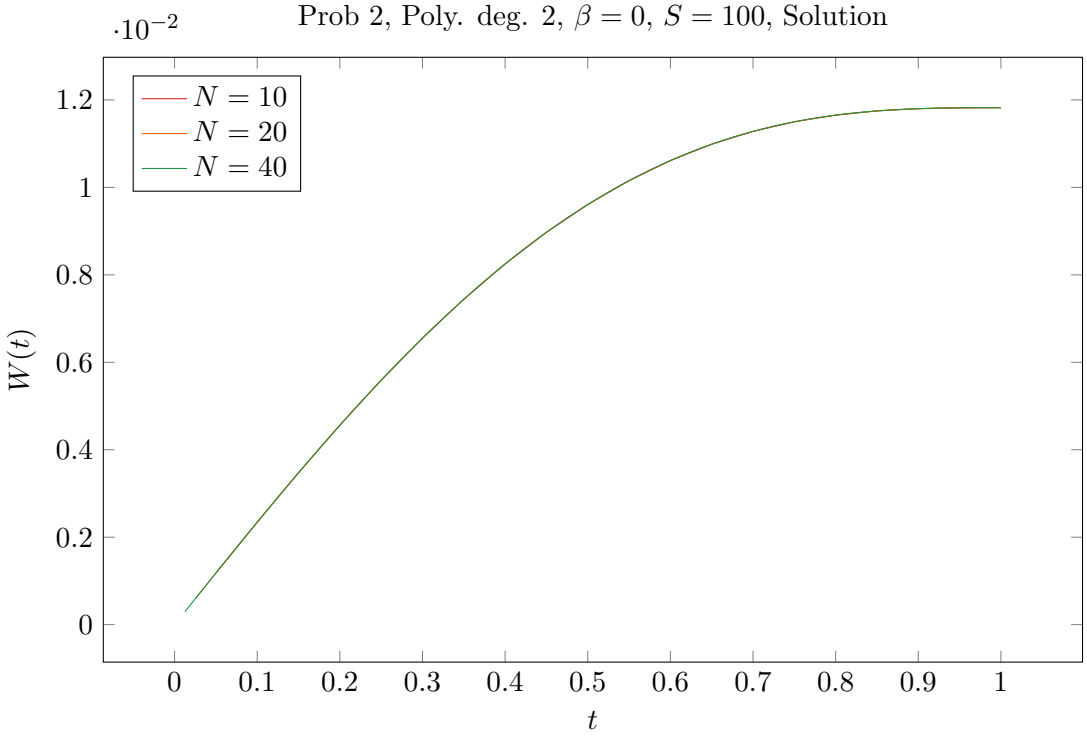




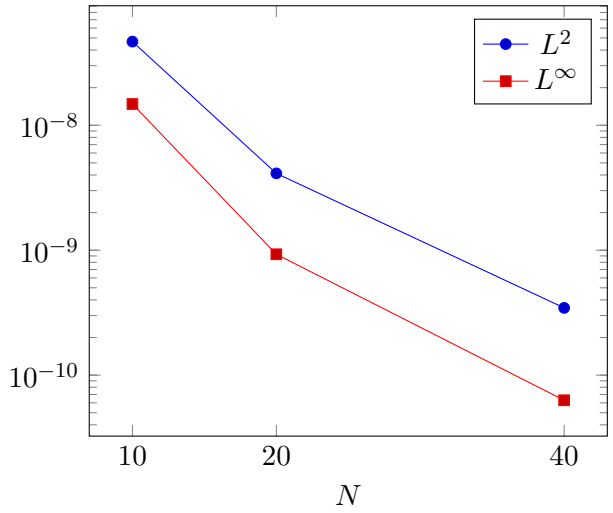
Prob. 1, Poly. deg. 3, $S = 10000$ Error Norms

N	L^2	L^∞	H^1
10	$2.55348889e{-8}$	$5.81486921e{-9}$	$2.20122358e{-14}$
20	$2.25742353e{-9}$	$3.64382554e{-10}$	$3.44001239e{-16}$
40	$1.99539134e{-10}$	$2.28040888e{-11}$	$5.37531839e{-18}$

Problem 2

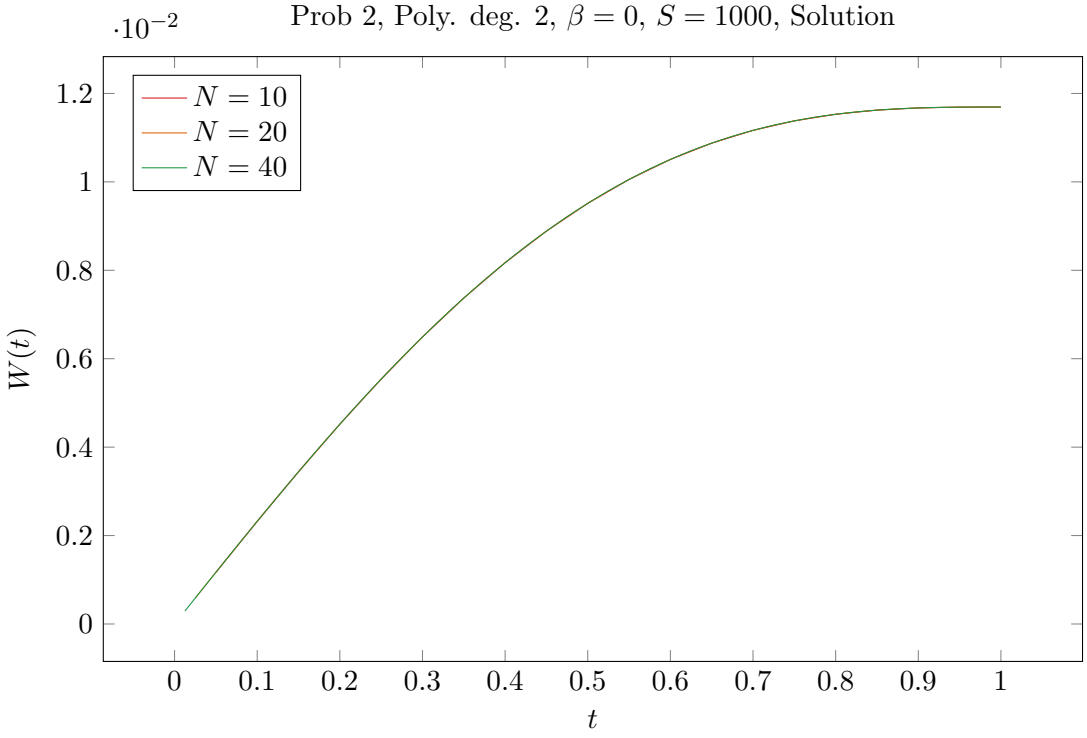


Prob 2, Poly. deg. 2, $\beta = 0$, $S = 100$, Error Norms

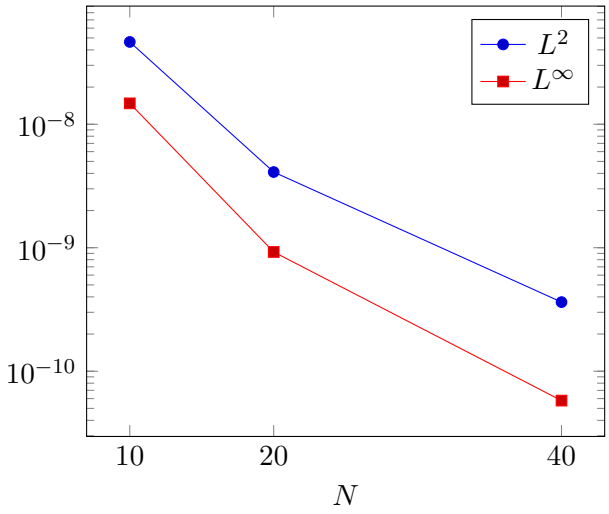


Prob. 2, Poly. deg. 2, $\beta = 0$, $S = 100$ Error Norms

N	L^2	L^∞	H^1
10	$4.67363468e{-8}$	$1.47965234e{-8}$	$1.16697236e{-13}$
20	$4.11992911e{-9}$	$9.28051788e{-10}$	$1.82834642e{-15}$
40	$3.45328237e{-10}$	$6.29416606e{-11}$	$2.85860952e{-17}$

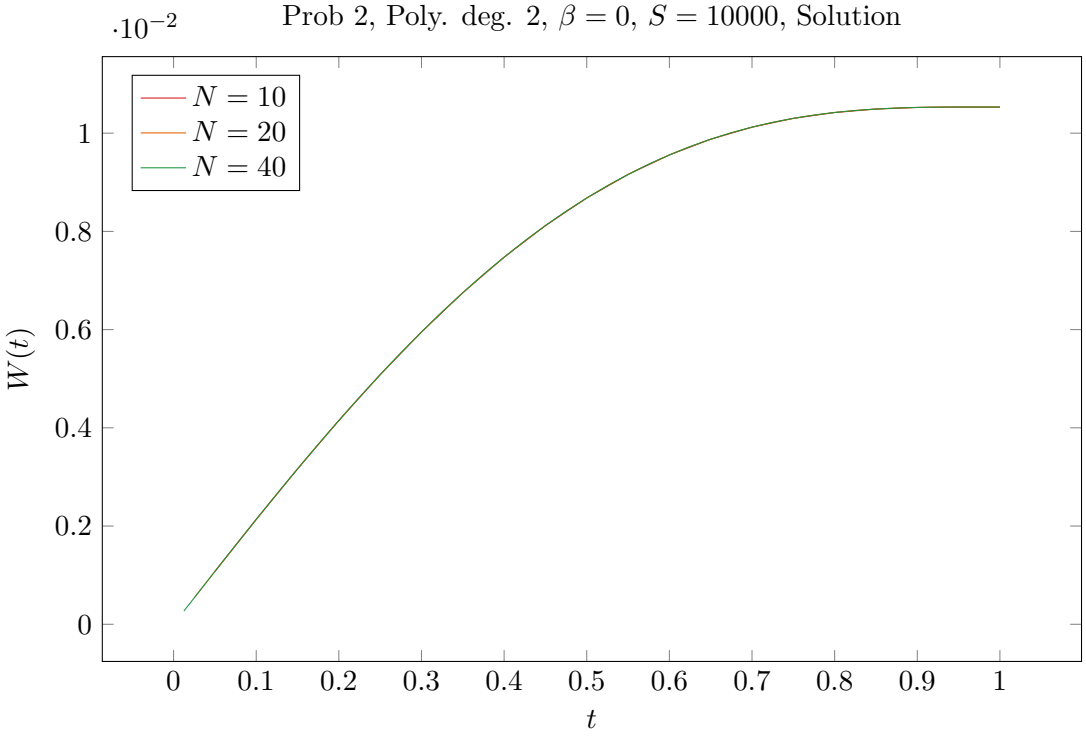


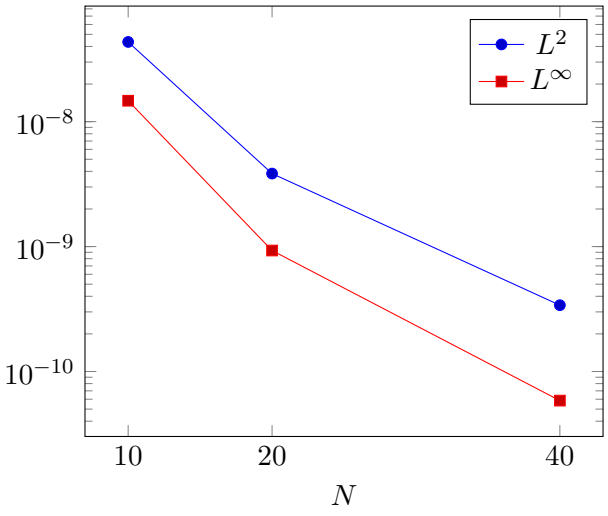
Prob 2, Poly. deg. 2, $\beta = 0$, $S = 1000$, Error Norms



Prob. 2, Poly. deg. 2, $\beta = 0$, $S = 1000$ Error Norms

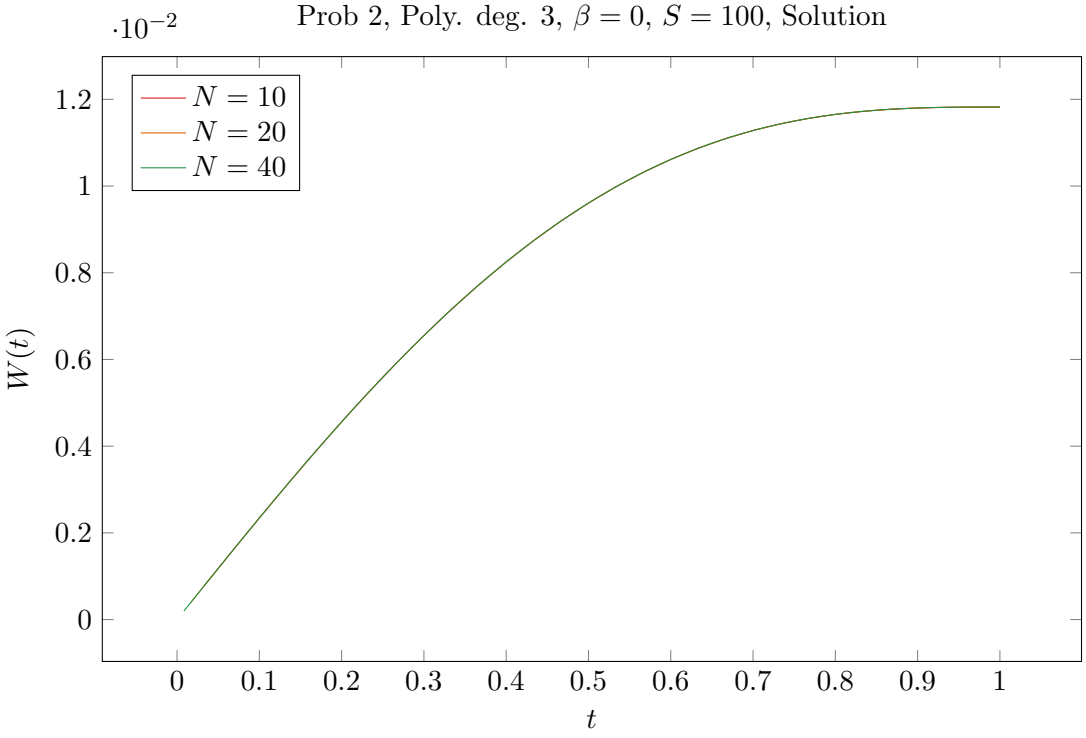
N	L^2	L^∞	H^1
10	$4.63948278e{-8}$	$1.47642788e{-8}$	$1.16218343e{-13}$
20	$4.10078199e{-9}$	$9.23795190e{-10}$	$1.81590237e{-15}$
40	$3.62705431e{-10}$	$5.78117745e{-11}$	$2.83740295e{-17}$

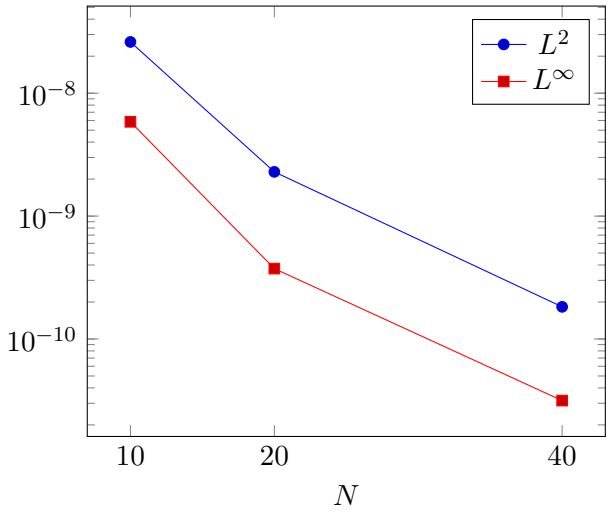




Prob. 2, Poly. deg. 2, $\beta = 0$, $S = 10000$ Error Norms

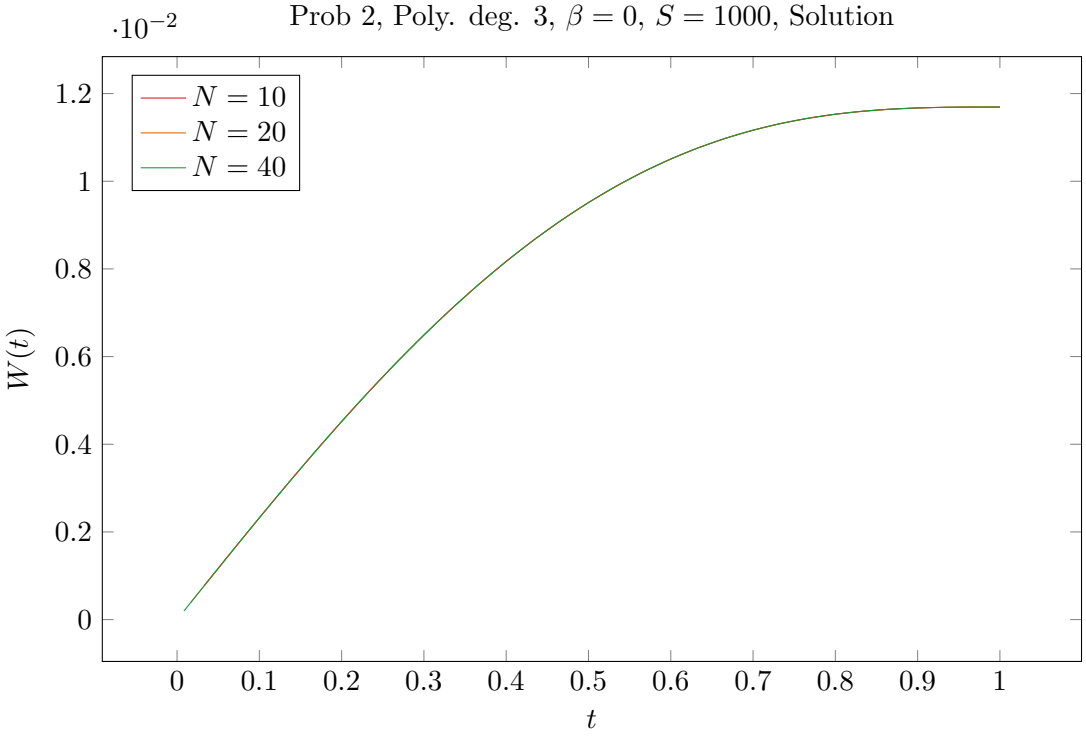
N	L^2	L^∞	H^1
10	$4.34701434e{-8}$	$1.47098626e{-8}$	$1.11800305e{-13}$
20	$3.84103937e{-9}$	$9.29929390e{-10}$	$1.74683608e{-15}$
40	$3.39459393e{-10}$	$5.84704802e{-11}$	$2.72941127e{-17}$



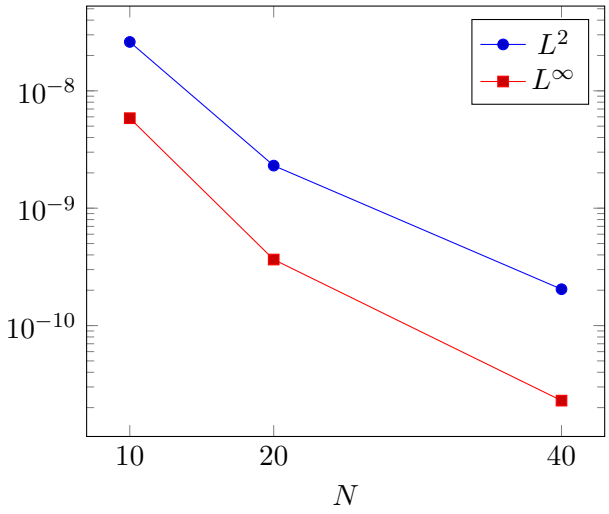


Prob. 2, Poly. deg. 3, $\beta = 0$, $S = 100$ Error Norms

N	L^2	L^∞	H^1
10	$2.61192667e{-8}$	$5.85228545e{-9}$	$2.30530413e{-14}$
20	$2.29017030e{-9}$	$3.73940253e{-10}$	$3.61921369e{-16}$
40	$1.82672228e{-10}$	$3.15374133e{-11}$	$6.54943166e{-18}$

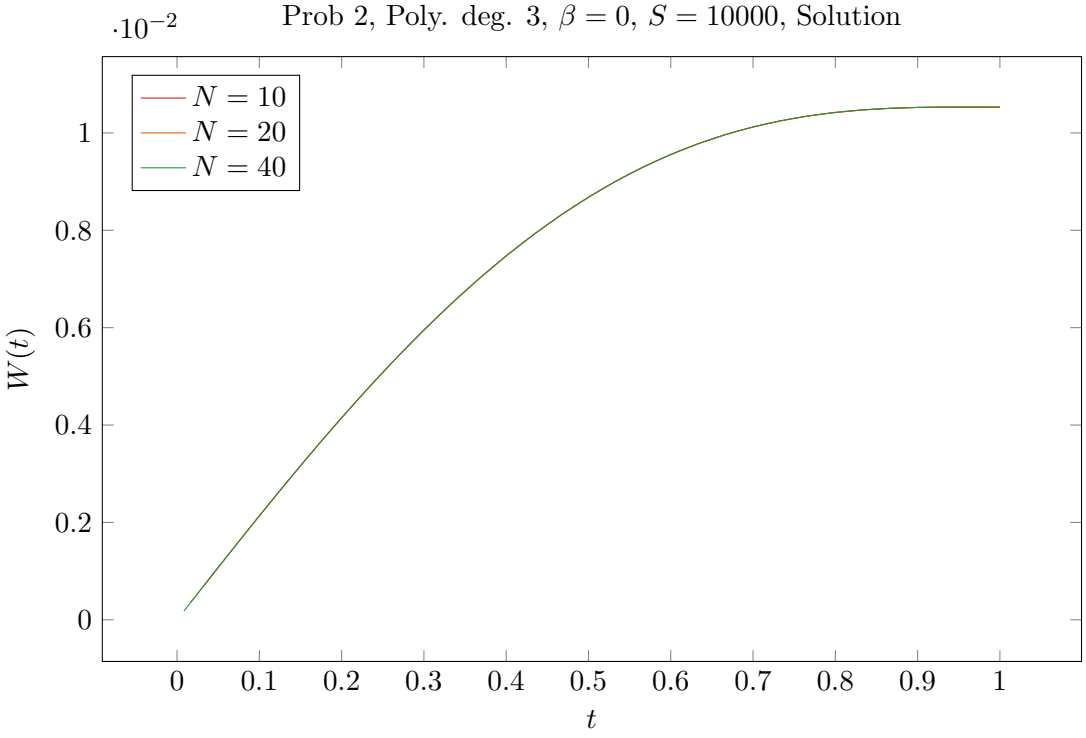


Prob 2, Poly. deg. 3, $\beta = 0$, $S = 1000$, Error Norms

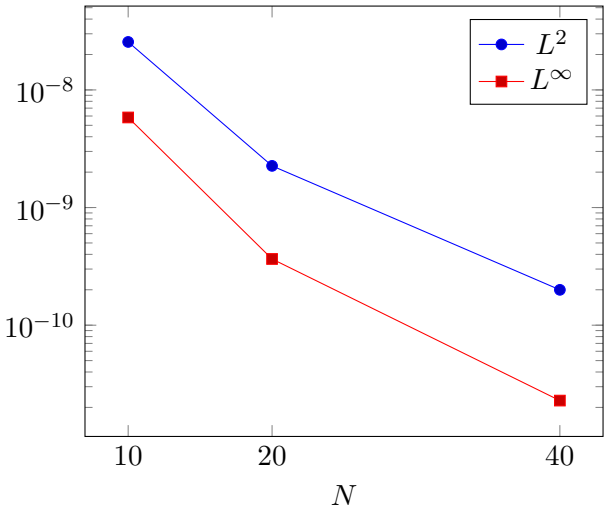


Prob. 2, Poly. deg. 3, $\beta = 0$, $S = 1000$ Error Norms

N	L^2	L^∞	H^1
10	$2.60800401e{-8}$	$5.84258417e{-9}$	$2.29562521e{-14}$
20	$2.30543408e{-9}$	$3.65280654e{-10}$	$3.58686853e{-16}$
40	$2.04048414e{-10}$	$2.29455292e{-11}$	$5.60606566e{-18}$

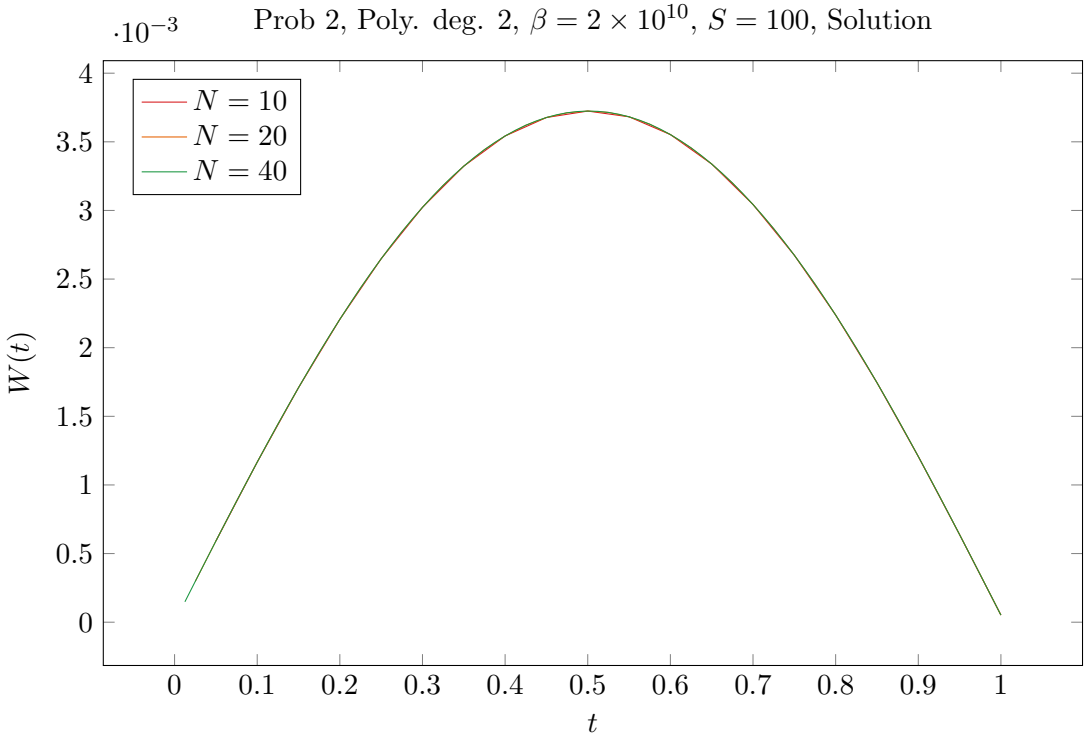


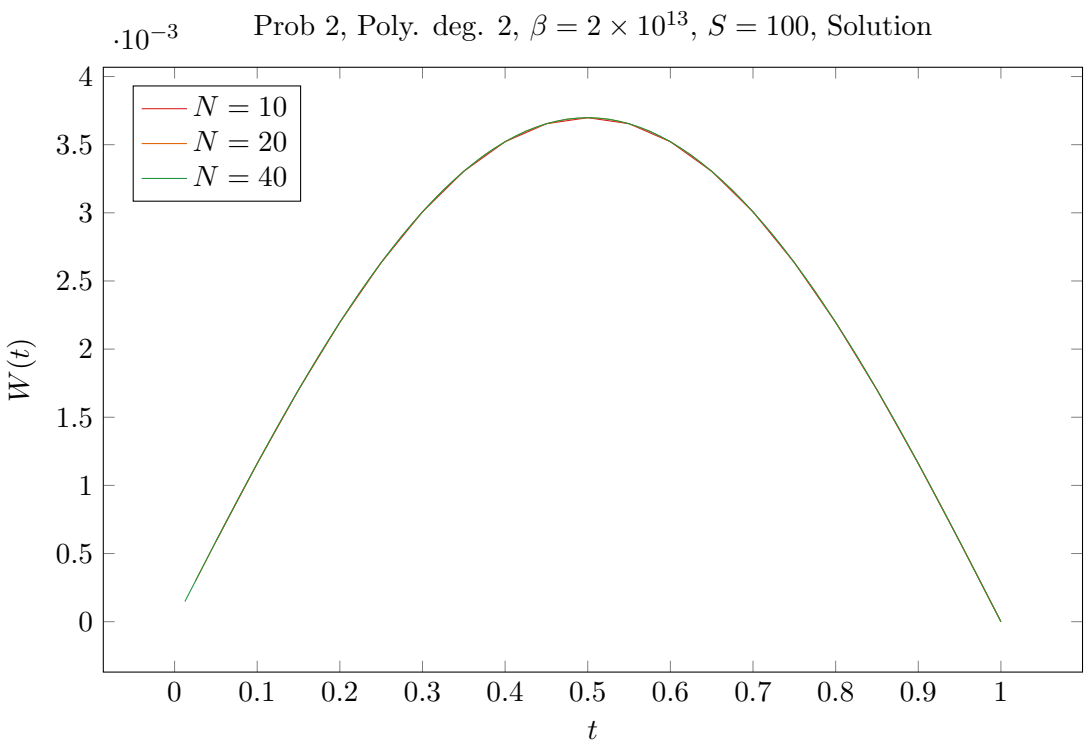
Prob 2, Poly. deg. 3, $\beta = 0$, $S = 10000$, Error Norms

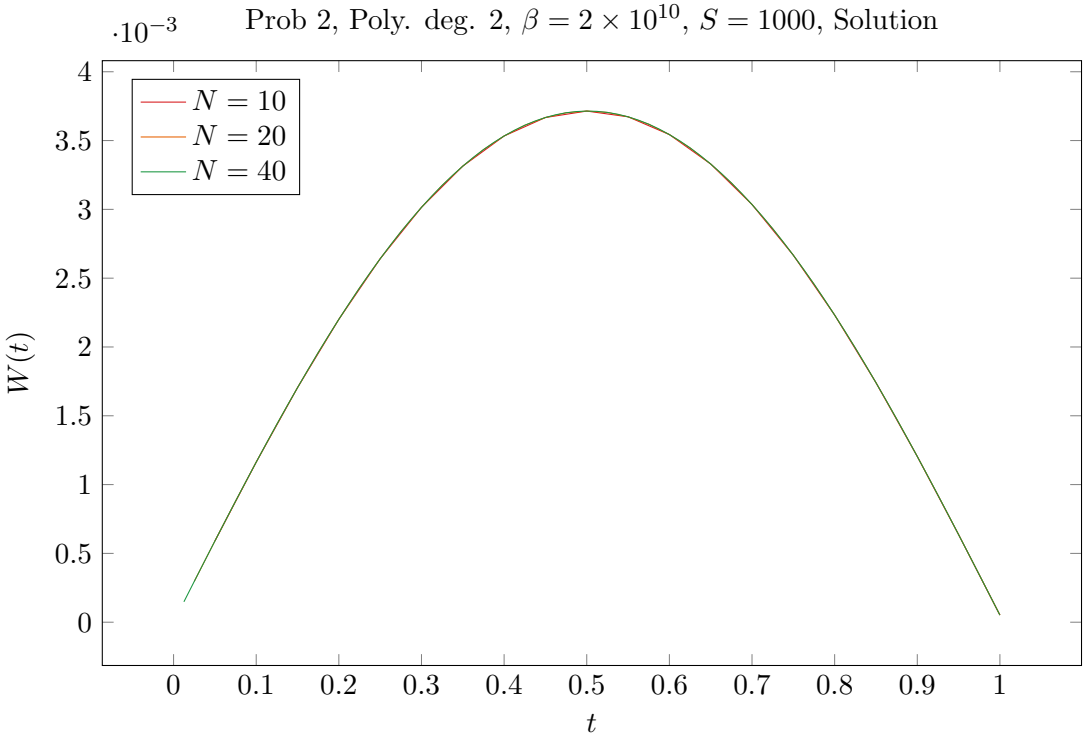


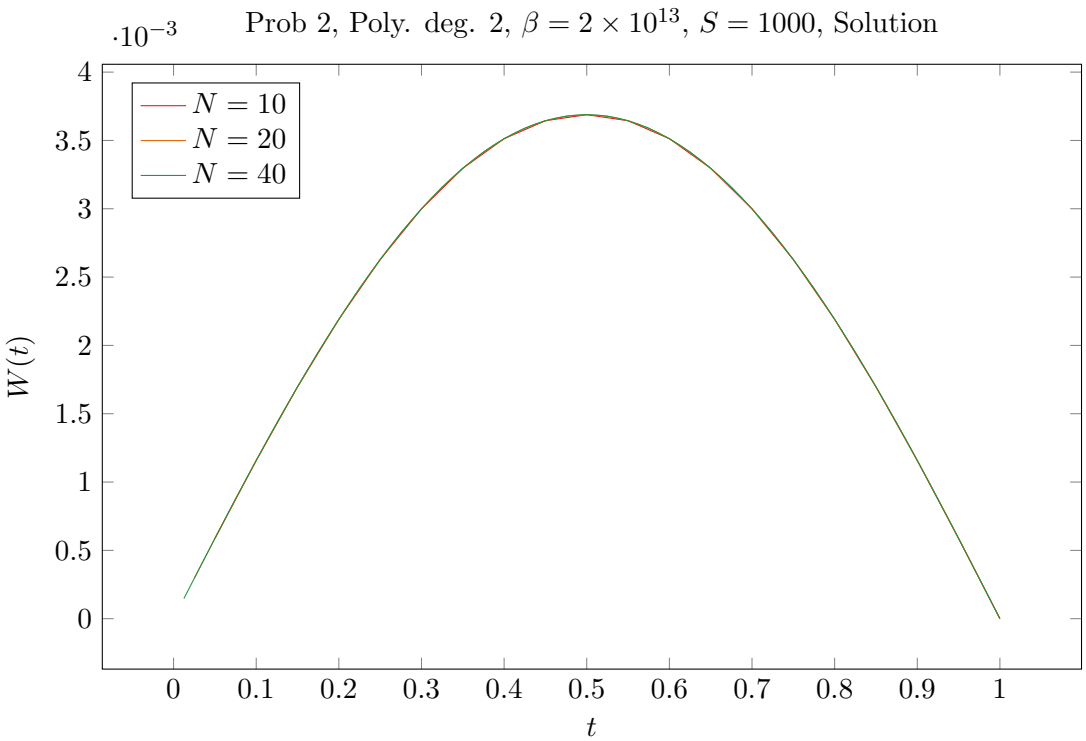
Prob. 2, Poly. deg. 3, $\beta = 0$, $S = 10000$ Error Norms

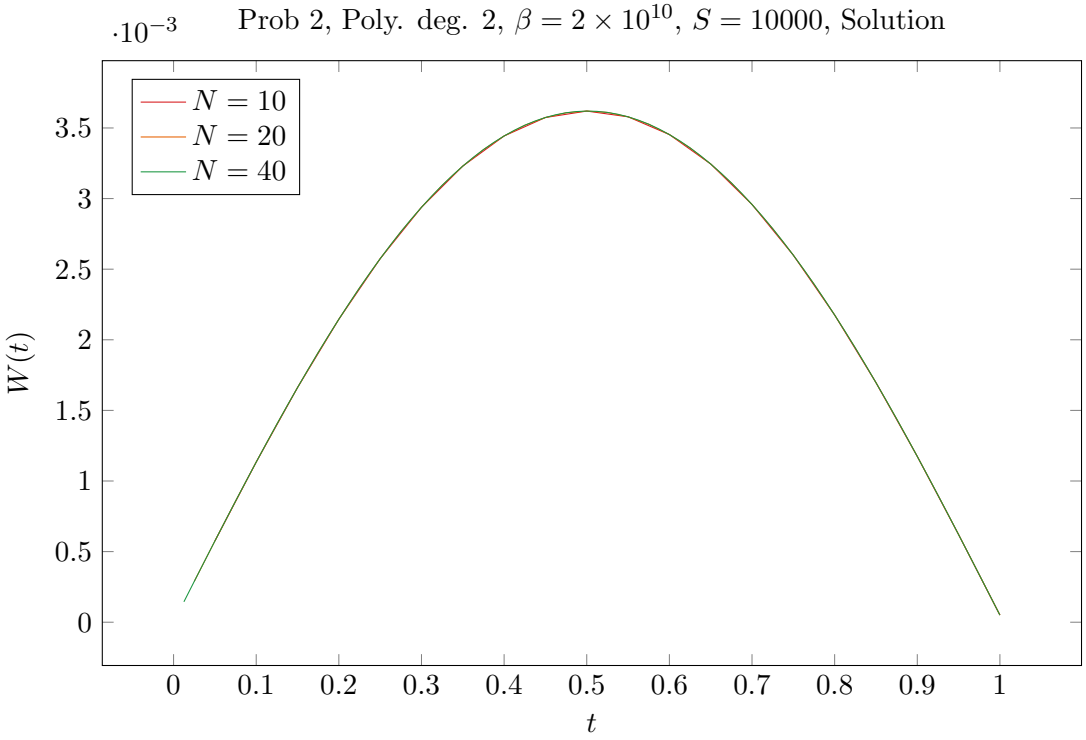
N	L^2	L^∞	H^1
10	$2.55733103e{-8}$	$5.83172443e{-9}$	$2.20781587e{-14}$
20	$2.26081312e{-9}$	$3.65455471e{-10}$	$3.45031139e{-16}$
40	$1.99777128e{-10}$	$2.28604254e{-11}$	$5.39135775e{-18}$

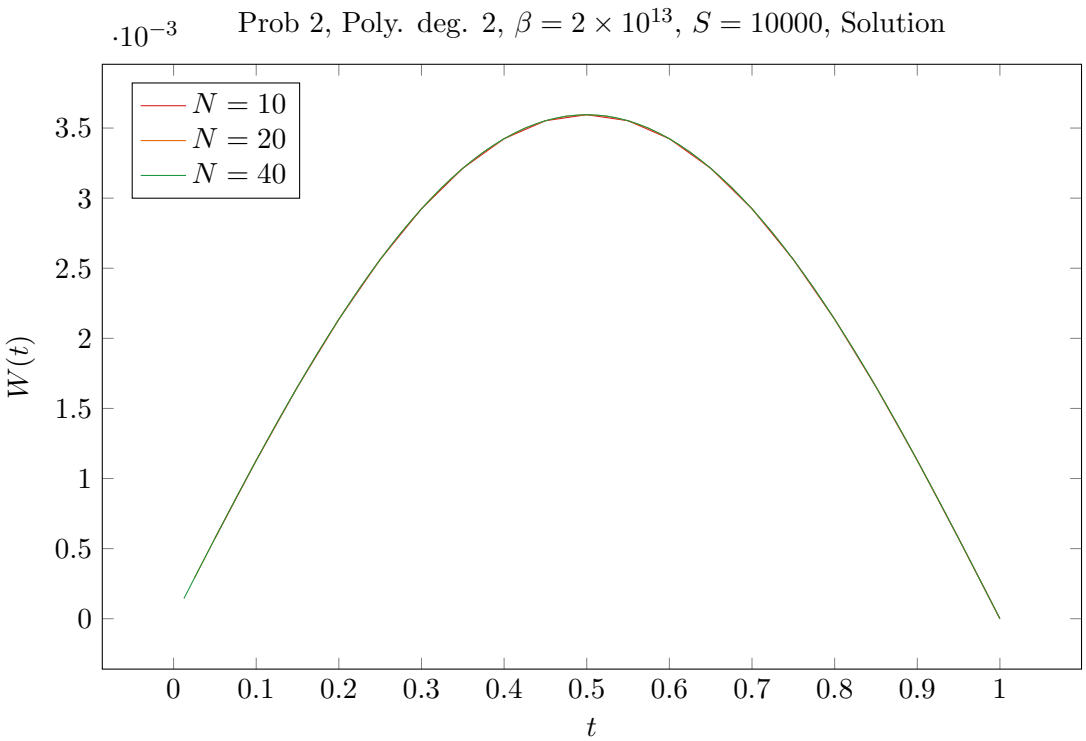

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{10}$, $S = 100$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

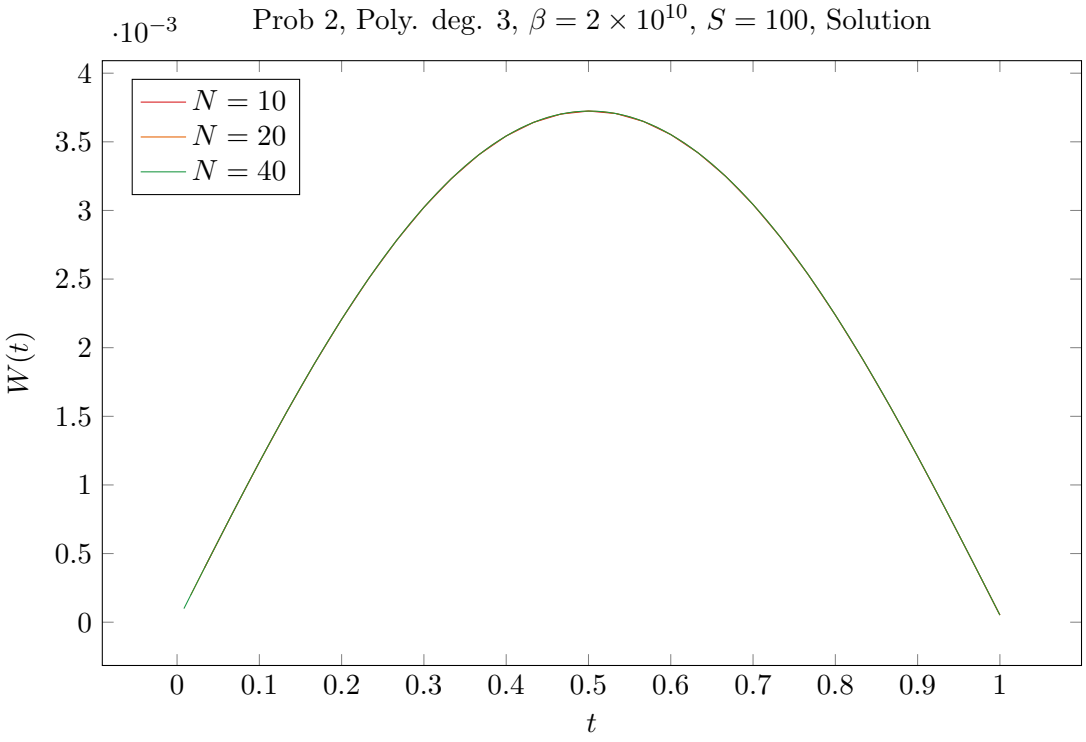

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{13}$, $S = 100$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

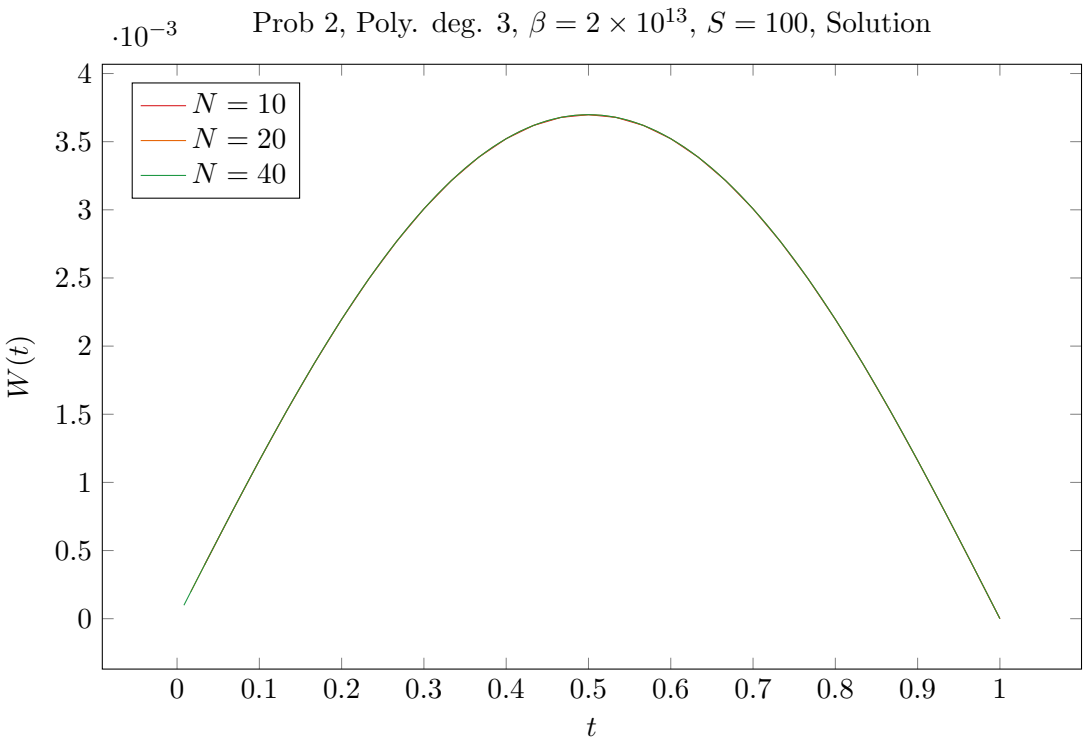

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{10}$, $S = 1000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

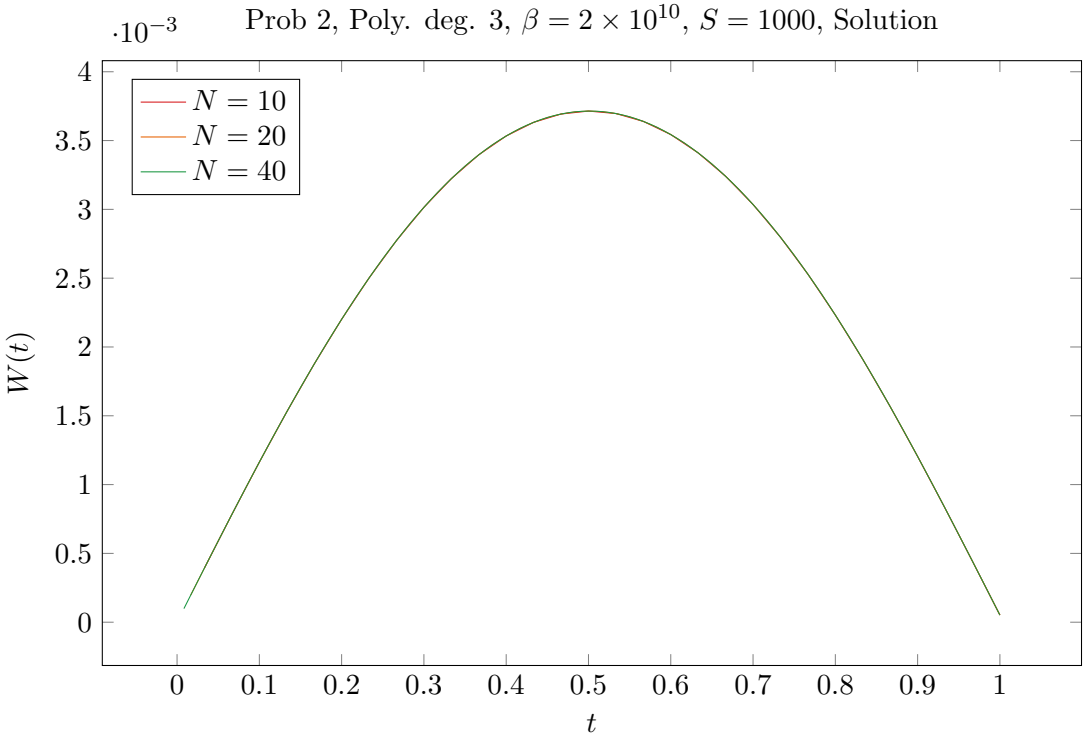

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{13}$, $S = 1000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

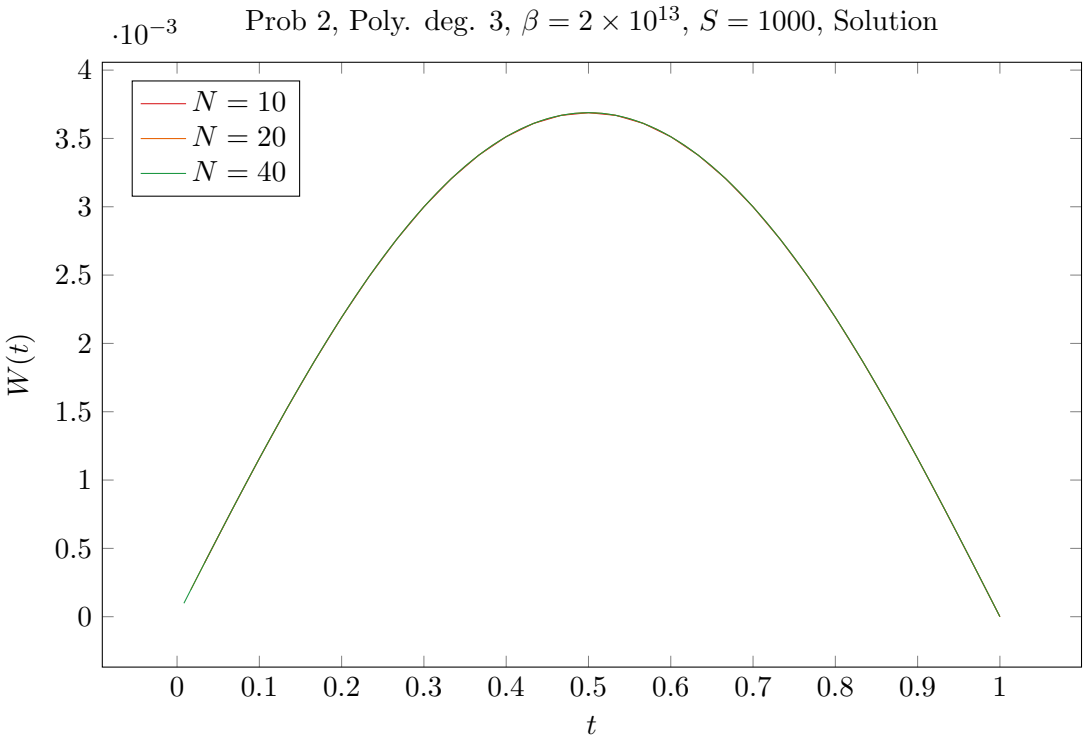

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{10}$, $S = 10000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

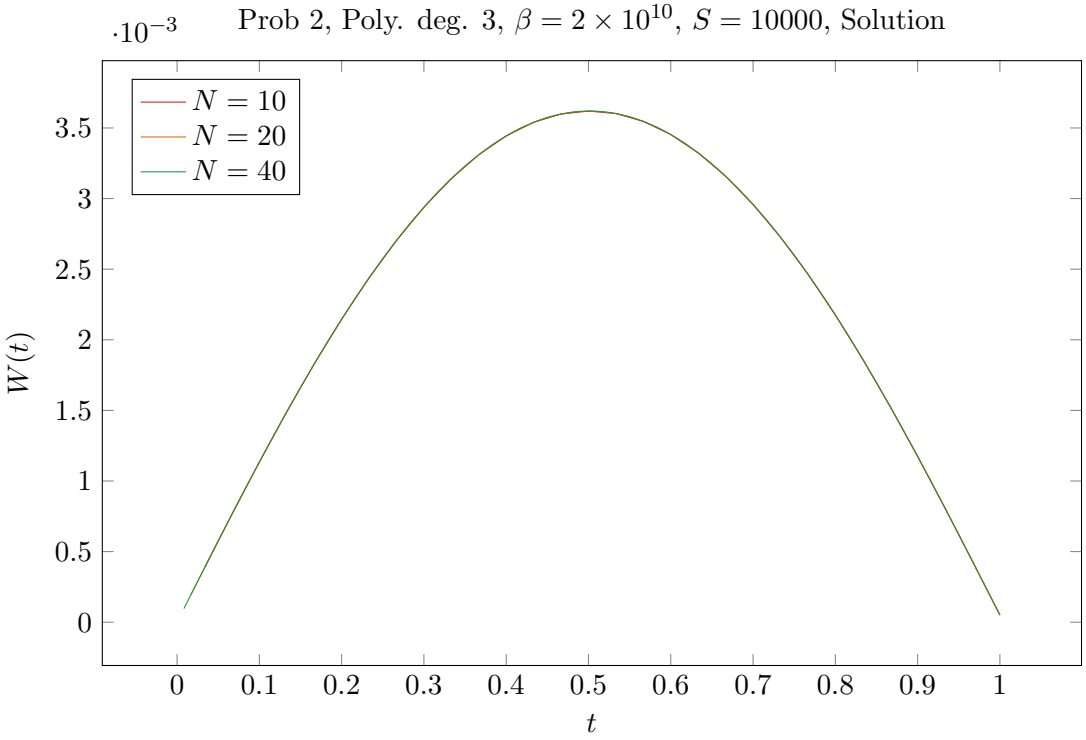

Prob 2, Poly. deg. 2, $\beta = 2 \times 10^{13}$, $S = 10000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9

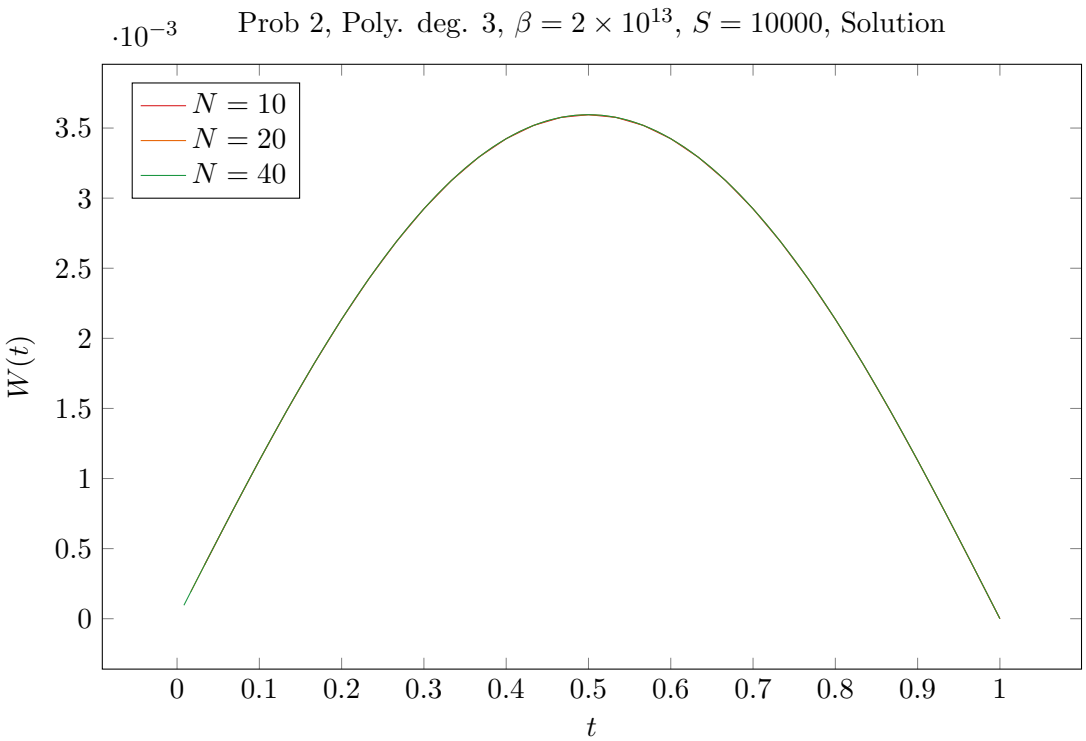

Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{10}$, $S = 100$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{13}$, $S = 100$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t
0
0.5
1
1.5
2
2.5
3
3.5
4
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9


Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{10}$, $S = 1000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t


Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{13}$, $S = 1000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t


Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{10}$, $S = 10000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t


Prob 2, Poly. deg. 3, $\beta = 2 \times 10^{13}$, $S = 10000$, Solution
$\cdot 10^{-3}$
$N = 10$
$N = 20$
$N = 40$
$W(t)$
t