

SUMT Exterior Penalty						
P	1	2	3	4	5	6
r_p	1	5	25	125	625	3125
x^0	0	1.276757470185778	1.367313681237115	1.506572258345380	1.427422323989274	1.303404309890892
	0	14.282241785987278	15.246682636432020	16.838371086757036	16.206891583266160	14.966946773637224
	0	-2.921714161272035	-2.644356099023211	-1.870468397277544	-0.802253513342547	0.119199519530206
x^*	1.276757470185778	1.367313681237115	1.506572258345380	1.427422323989274	1.303404309890892	1.245616259723662
	14.282241785987278	15.246682636432020	16.838371086757036	16.206891583266160	14.966946773637224	14.388663156694799
	-2.921714161272035	-2.644356099023211	-1.870468397277544	-0.802253513342547	0.119199519530206	0.561694734918270
$f(x^*)$	0.042441427986762	0.998187804502612	12.280830393731572	43.071049159105527	73.991792246489879	89.163085342838670
$g1(x^*)$	-2.830272410557335	-3.101941043711345	-3.519716775036141	-3.282266971967823	-2.910212929672675	-2.736848779170986
$g2(x^*)$	0.021405976148623	0.093850944989692	0.205257806676304	0.141937859191420	0.042723447912713	-0.003506992221070
$g3(x^*)$	0.020160127570520	0.089048759745144	0.202740791911217	0.157635113090440	0.069067626688373	0.027761654049628
$g4(x^*)$	-0.785280223248410	-0.905835329554002	-1.104796385844629	-1.025861447908270	-0.870868346704653	-0.798582894586850
$g5(x^*)$	-1.292171416127204	-1.264435609902321	-1.187046839727754	-1.080225351334255	-0.988080048046979	-0.943830526508173
$g6(x^*)$	-0.415657167745593	-0.471128780195358	-0.625906320544491	-0.839549297331491	-1.023839903906041	-1.112338946983654
$g7(x^*)$	-0.982605869505924	-0.909661346819279	-0.650857147798434	-0.380495404354177	-0.258569839380015	-0.222185320500602
$g8(x^*)$	0.977636117936188	0.883850303053359	0.551102047169415	0.203494091312514	0.046732650631447	-0.000047445070655
$g9(x^*)$	0.978980601697539	0.891179580663644	0.578456062297739	0.240161390982396	0.080283680647589	0.029396406892983
No. or inter	28	11	12	12	11	16
exit- flag	1	1	1	1	1	1

SUMT Exterior Penalty (contd.)						
P	7	8	9	10	11	12
r_p	15625	78125	390625	1953125	9765625	48828125
x^0	1.245616259723662 14.388663156694799 0.561694734918270	1.245616259723662 14.086828912272756 0.804461916983293	1.245616259723662 14.017801197861015 0.861374375049149	1.245616259723662 14.003578018675936 0.873170186707270	1.245616259723662 14.000715961212642 0.875546689456223	1.245616259723662 14.000141871099446 0.876023217302232
x^*	1.245616259723662 14.086828912272756 0.804461916983293	1.245616259723662 14.017801197861015 0.861374375049149	1.245616259723662 14.003578018675936 0.873170186707270	1.245616259723662 14.000715961212642 0.875546689456223	1.245616259723662 14.000141871099446 0.876023217302232	1.245616259723662 14.000028148183382 0.876117920663847
$f(x^*)$	97.508790704715992	99.465946895373833	99.871598089342427	99.953324735102143	99.969707396335551	99.972968423565220
$g1(x^*)$	-2.736848779170986	-2.736848779170986	-2.736848779170986	-2.736848779170986	-2.736848779170986	-2.736848779170986
$g2(x^*)$	-0.003506992221070	-0.003506992221070	-0.003506992221070	-0.003506992221070	-0.003506992221070	-0.003506992221070
$g3(x^*)$	0.006202065162340	0.001271514132930	0.000255572762567	0.000051140086617	0.000010133649960	0.000002010584527
$g4(x^*)$	-0.760853614034094	-0.752225149732627	-0.750447252334492	-0.750089495151580	-0.750017733887431	-0.750003518522923
$g5(x^*)$	-0.919553808301671	-0.913862562495085	-0.912682981329273	-0.912445331054378	-0.912397678269777	-0.912388207933615
$g6(x^*)$	-1.160892383396658	-1.172274875009830	-1.174634037341454	-1.175109337891244	-1.175204643460446	-1.175223584132769
$g7(x^*)$	-0.186597549678368	-0.178474966383863	-0.176801461345889	-0.176464711465342	-0.176397224231205	-0.176383791316146
$g8(x^*)$	-0.045803150413527	-0.056246471792176	-0.058398121126714	-0.058831085258847	-0.058917854559879	-0.058935125450669
$g9(x^*)$	0.006280001254589	0.001274791082862	0.000255738700570	0.000051180151172	0.000010241746917	0.000002055002479
No. or inter	11	9	6	10	7	6
exit- flag	1	1	1	2	2	2

SUMT Exterior Penalty (contd.)			
P	13	14	15
r_p	244140625	1.220703125000000e+09	6.103515625000000e+09
x^0	1.245616259723662 14.000028148183382 0.876117920663847	1.245616259723662 14.000028468800194 0.876124113338654	1.245616259723662 13.999945578745367 0.876171322149313
x^*	1.245616259723662 14.000028468800194 0.876124113338654	1.245616259723662 13.999945578745367 0.876171322149313	1.245616259723662 13.999945706938167 0.876171575563591
$f(x^*)$	99.973292446196567	99.974543837296977	99.974558740329954
$g_1(x^*)$	-2.736848779170986	-2.736848779170986	-2.736848779170986
$g_2(x^*)$	-0.003506992221070	-0.003506992221070	-0.003506992221070
$g_3(x^*)$	0.000002033485728	-0.000003887232474	-0.000003878075845
$g_4(x^*)$	-0.750003558600024	-0.749993197343171	-0.749993213367271
$g_5(x^*)$	-0.912387588666135	-0.912382867785069	-0.912382842443641
$g_6(x^*)$	-1.175224822667731	-1.175234264429863	-1.175234315112718
$g_7(x^*)$	-0.176382456604978	-0.176377301906091	-0.176377240518085
$g_8(x^*)$	-0.058936841507885	-0.058943468977884	-0.058943547905320
$g_9(x^*)$	0.000000411554760	0.000000073690674	-0.000000010000120
No. or inter	2	3	1
exit- flag	2	2	2

SUMT Interior Penalty						
P	1	2	3	4	5	6
r_p	1	0.200000000000000	0.040000000000000	0.008000000000000	0.001600000000000	3.20000000000000e-04
x^0	0.475058013560474 13.235315387885350 9.002524127606579	1.242051716019787 13.441551104374039 1.207219398288423	1.21034451759675 13.985678615012258 0.888073797550397	1.211402342892526 13.997185781437357 0.878480256183915	1.211402819590726 13.999439081569248 0.876607277522905	1.211402860049516 13.999886801893286 0.876235124597706
x^*	1.242051716019787 13.441551104374039 1.207219398288423	1.210344517596750 13.985678615012258 0.888073797550397	1.211402342892526 13.997185781437357 0.878480256183915	1.211402819590726 13.999439081569248 0.876607277522905	1.211402860049516 13.999886801893286 0.876235124597706	1.211402860049516 13.999886801893286 0.876235124597706
$f(x^*)$	1.085725163937203e+02	1.003845543265858e+02	1.000542248860218e+02	99.989798142317724	99.976995576143040	99.976995576143040
$g_1(x^*)$	-2.726155148059362	-2.631033552790250	-2.634207028677577	-2.634208458772178	-2.634208580148548	-2.634208580148548
$g_2(x^*)$	-0.006358627184170	-0.031724385922600	-0.030878125685979	-0.030877744327419	-0.030877711960387	-0.030877711960387
$g_3(x^*)$	-0.039889206830426	-0.001022956070553	-0.000201015611617	-0.000040065602197	-0.000008085579051	-0.000008085579051
$g_4(x^*)$	-0.680193888046755	-0.748209826876532	-0.749648222679670	-0.749929885196156	-0.749985850236661	-0.749985850236661
$g_5(x^*)$	-0.879278060171158	-0.911192620244960	-0.912151974381608	-0.912339272247709	-0.912376487540229	-0.912376487540229
$g_6(x^*)$	-1.241443879657685	-1.177614759510079	-1.175696051236783	-1.175321455504581	-1.175247024919541	-1.175247024919541
$g_7(x^*)$	-0.144147441149831	-0.198060182424997	-0.198680986541584	-0.198938704839049	-0.198989963161419	-0.198989963161419
$g_8(x^*)$	-0.100381861378789	-0.031065479739289	-0.030267303017964	-0.029935950921224	-0.029870047363890	-0.029870047363890
$g_9(x^*)$	-0.000548728235836	-0.001027242204078	-0.000201145923403	-0.000040033071945	-0.000007989634798	-0.000007989634798
No. or inter	45	28	16	8	8	1
exit- flag	0	5	1	2	2	2

SUMT Linear Extended Interior Penalty						
P	1	2	3	4	5	6
r_p	25.470164726578144	5.094032945315629	1.018806589063126	0.203761317812625	0.040752263562525	0.008150452712505
x^0	0.475058013560474 13.235315387885350 9.002524127606579	0.834131139714169 11.963258962706560 3.941625283990999	1.000652394693517 12.236051713002341 2.853394922611828	1.115365666879351 13.021288169458897 1.821546258167441	1.170535609943452 13.539475377703932 1.285556001618355	1.194427876487765 13.797706316840070 1.049162277714346
x^*	0.834131139714169 11.963258962706560 3.941625283990999	1.000652394693517 12.236051713002341 2.853394922611828	1.115365666879351 13.021288169458897 1.821546258167441	1.170535609943452 13.539475377703932 1.285556001618355	1.194427876487765 13.797706316840070 1.049162277714346	1.204528077550375 13.910737956511738 0.951239741438898
$f(x^*)$	2.341273493200837e+02	1.741522415104640e+02	1.338170291786038e+02	1.143006844268324e+02	1.059680557512164e+02	1.025646990423054e+02
$g1(x^*)$	-1.502393419142507	-2.001957184080550	-2.346097000638052	-2.511606829830356	-2.583283629463295	-2.613584232651124
$g2(x^*)$	-0.332695088228665	-0.199478084245187	-0.107707466496520	-0.063571512045238	-0.044457698809788	-0.036377537959700
$g3(x^*)$	-0.145481502663817	-0.125996306214119	-0.069907987895793	-0.032894615878291	-0.014449548797138	-0.006375860249162
$g4(x^*)$	-0.495407370338320	-0.529506464125293	-0.627661021182362	-0.692434422212991	-0.724713289605009	-0.738842244563967
$g5(x^*)$	-0.605837471600900	-0.714660507738817	-0.817845374183256	-0.871444399838164	-0.895083772228565	-0.904876025856110
$g6(x^*)$	-1.788325056798200	-1.570678984522365	-1.364309251633488	-1.257111200323671	-1.209832455542869	-1.190247948287779
$g7(x^*)$	-0.155966408891668	-0.126732905568099	-0.146757879358040	-0.172423083865238	-0.186894804084932	-0.193294151858642
$g8(x^*)$	-0.085186045710712	-0.122771978555302	-0.097025583682521	-0.064027463601837	-0.045420966176516	-0.037193233324603
$g9(x^*)$	-0.307689036998923	-0.153545536283816	-0.076065102486295	-0.034082425370034	-0.014666412977479	-0.006417151777776
No. or inter	30	21	15	12	11	12
exit- flag	1	1	1	2	2	2

SUMT Linear Extended Interior Penalty (contd.)

P	7	8	9	10	11	12
r_p	0.001630090542501	3.260181085002002e-04	6.520362170004005e-05	1.304072434000801e-05	2.608144868001602e-06	5.216289736003204e-07
x^0	1.204528077550375 13.910737956511738 0.951239741438898	1.208901119373016 13.960166023280568 0.909416823572248	1.210840470509089 13.982165326219759 0.890992681080089	1.210847079236560 13.992015030592004 0.882781309378108	1.210847950693696 13.996426312711483 0.879111128648261	1.210848048770953 13.998400279770372 0.877469908221259
x^*	1.208901119373016 13.960166023280568 0.909416823572248	1.210840470509089 13.982165326219759 0.890992681080089	1.210847079236560 13.992015030592004 0.882781309378108	1.210847950693696 13.996426312711483 0.879111128648261	1.210848048770953 13.998400279770372 0.877469908221259	1.210848059661707 13.999285769555806 0.876734896921222
$f(x^*)$	1.011197365889512e+02	1.004848299247179e+02	1.002021856974592e+02	1.000759162584386e+02	1.000194578080266e+02	99.994191487556009
$g1(x^*)$	-2.626703358119049	-2.632521411527267	-2.632541237709678	-2.632543852081089	-2.632544146312859	-2.632544178985120
$g2(x^*)$	-0.032879104501587	-0.031327623592729	-0.031322336610752	-0.031321639445043	-0.031321560983238	-0.031321552270635
$g3(x^*)$	-0.002845284051388	-0.001273905270017	-0.000570354957714	-0.000255263377751	-0.000114265730688	-0.000051016460300
$g4(x^*)$	-0.745020752910071	-0.747770665777470	-0.749001878824000	-0.749553289088935	-0.749800034971297	-0.749910721194476
$g5(x^*)$	-0.909058317642775	-0.910900731891991	-0.911721869062189	-0.912088887135174	-0.912253009177874	-0.912326510307878
$g6(x^*)$	-1.181883364714450	-1.178198536216018	-1.176556261875622	-1.175822225729652	-1.175493981644252	-1.175346979384244
$g7(x^*)$	-0.196088822665686	-0.197330979336961	-0.198456275204993	-0.198960889175684	-0.199186811785869	-0.199287959304693
$g8(x^*)$	-0.033600085144118	-0.032003026566764	-0.030556217593580	-0.029907428202692	-0.029616956275312	-0.029486909465395
$g9(x^*)$	-0.002853403964909	-0.001275497992858	-0.000570663546899	-0.000255284465680	-0.000114124394406	-0.000051050701659
No. or inter	14	18	11	9	7	9
exit- flag	2	1	2	2	2	2

SUMT Linear Extended Interior Penalty (contd.)						
P	13	14	15	16	17	18
r_p	1.043257947200641e-07	2.086515894401282e-08	4.173031788802563e-09	8.346063577605127e-10	1.669212715521025e-10	3.338425431042051e-11
x^0	1.210848059661707 13.999285769555806 0.876734896921222	.210848060519287 13.999680238393443 0.876407262920070	1.210848060610322 13.999856141842171 0.876260686095742	1.210848060613061 13.999935357586557 0.876195182975888	1.210848060613061 13.999933541764523 0.876186705813254	1.210848060613061 13.999933117801678 0.876183349749345
x^*	.210848060519287 13.999680238393443 .876407262920070	1.210848060610322 13.999856141842171 0.876260686095742	.210848060613061 13.999935357586557 .876195182975888	1.210848060613061 13.999933541764523 0.876186705813254	1.210848060613061 13.999933117801678 0.876183349749345	1.210848060613061 13.999932794893834 0.876182044674636
$f(x^*)$	99.982924965287467	99.977876251023361	99.975628700368688	99.975165477381864	99.974986302163842	99.974914369053806
$g1(x^*)$	-2.632544181557862	-2.632544181830967	-2.632544181839183	-2.632544181839183	-2.632544181839183	-2.632544181839183
$g2(x^*)$	-0.031321551584570	-0.031321551511742	-0.031321551509551	-0.031321551509551	-0.031321551509551	-0.031321551509551
$g3(x^*)$	-0.000022840114754	-0.000010275582702	-0.000004617315246	-0.000004747016820	-0.000004777299880	-0.000004800364726
$g4(x^*)$	-0.749960029799180	-0.749982017730271	-0.749991919698320	-0.749991692720565	-0.749991639725210	-0.749991599361729
$g5(x^*)$	-0.912359273707993	-0.912373931390426	-0.912380481702411	-0.912381329418675	-0.912381665025065	-0.912381795532536
$g6(x^*)$	-1.175281452584014	-1.175252137219148	-1.175239036595177	-1.175237341162651	-1.175236669949869	-1.175236408934927
$g7(x^*)$	-0.199333068828654	-0.199353284168184	-0.199362283678222	-0.199364138501386	-0.199364855950407	-0.199365143983386
$g8(x^*)$	-0.029428911506017	-0.029402920355192	-0.029391349556573	-0.029388964783933	-0.029388042349477	-0.029387672021360
$g9(x^*)$	-0.000022887989043	-0.000010203999392	-0.000004621901222	-0.000002175505821	-0.000001249121595	-0.000000866300566
No. or inter	7	9	7	2	2	1
exit- flag	2	2	2	2	2	2

ALM						
P	1	2	3	4	5	6
r _p	1	5	25	125	625	3125
x ⁰	0.350113005416948 8.217596212161899 -2.530475785010287	1.276756989556942 14.282393517682941 -2.921714790819759	1.415339832204870 15.759311463018443 -2.577782321399998	1.577158568494572 17.658668240467161 -1.689690306605792	1.408995023308075 16.087967822291439 -0.481294436641496	1.265605409167405 14.591070975135302 0.444008032949034
x [*]	1.276756989556942 14.282393517682941 -2.921714790819759	1.415339832204870 15.759311463018443 -2.577782321399998	1.577158568494572 17.658668240467161 -1.689690306605792	1.408995023308075 16.087967822291439 -0.481294436641496	1.265605409167405 14.591070975135302 0.444008032949034	1.237628759681719 14.185728965995825 0.727283434437060
f(x [*])	0.042441647159707	1.503066214958353	18.175845003904250	55.742698476949712	85.730125514583094	94.911527329259371
g1(x [*])	-2.830270968670827	-3.246019496614610	-3.731475705483716	-3.226985069924226	-2.796816227502215	-2.712886279045156
g2(x [*])	0.021405591645554	0.132271865763896	0.261726854795657	0.127196018646460	0.012484327333924	-0.009896992254625
g3(x [*])	0.020170965548781	0.125665104501317	0.261333445747654	0.149140558735103	0.042219355366807	0.013266354713988
g4(x [*])	-0.785299189710368	-0.969913932877305	-1.207333530058395	-1.010995977786430	-0.823883871891913	-0.773216120749478
g5(x [*])	-1.292171479081976	-1.257778232140000	-1.168969030660579	-1.048129443664150	-0.955599196705097	-0.927271656556294
g6(x [*])	-0.415657041836048	-0.484443535720000	-0.662061938678842	-0.903741112671701	-1.088801606589807	-1.145456686887412
g7(x [*])	-0.982605831141177	-0.885250947470214	-0.555346221114698	-0.304330799695254	-0.225066608955370	-0.202649636798318
g8(x [*])	0.977636068610084	0.852465503890276	0.428302284290326	0.105568171036755	0.003657068656904	-0.025164752687877
g9(x [*])	0.978980324117700	0.861975812157810	0.462183456018077	0.141927293274670	0.034876690638764	0.012720671491172
No. or inter	14	11	10	12	11	15
exit- flag	1	1	1	1	1	2

ALM (contd.)				
P	7	8	9	10
r_p	15625	78125	390625	1953125
x^0	1.237628759681719 14.185728965995825 0.727283434437060	1.237628759681719 14.005500456065775 0.872171151912445	1.237628759681719 14.000029126364613 0.876120282958519	1.237628759681719 13.999999657710770 0.876141650918566
x^*	1.237628759681719 14.005500456065775 0.872171151912445	1.237628759681719 14.000029126364613 0.876120282958519	1.237628759681719 13.999999657710770 0.876141650918566	1.237628759681719 13.999999659075149 0.876141664870233
$f(x^*)$	99.847492383823834	99.973104250604877	99.973785629943563	99.973786369114805
$g1(x^*)$	-2.712886279045156	-2.712886279045156	-2.712886279045156	-2.712886279045156
$g2(x^*)$	-0.009896992254625	-0.009896992254625	-0.009896992254625	-0.009896992254625
$g3(x^*)$	0.000392889718984	0.000002080454615	-0.000000024449231	-0.000000024351775
$g4(x^*)$	-0.750687557008222	-0.750003640795577	-0.749999957213846	-0.749999957384394
$g5(x^*)$	-0.912782884808755	-0.912387971704148	-0.912385834908143	-0.912385833512977
$g6(x^*)$	-1.174434230382489	-1.175224056591704	-1.175228330183713	-1.175228332974047
$g7(x^*)$	-0.182178927944464	-0.181664664939527	-0.181661876210281	-0.181661873185027
$g8(x^*)$	-0.051484235499974	-0.052145430792037	-0.052149016301068	-0.052149020190679
$g9(x^*)$	0.000239168407692	0.000001305815426	0.000000002916323	-0.000000000877958
No. or inter	11	4	4	1
exit- flag	1	2	5	5