## کوتاه ترین مسیر در شبکه شامل سلول و مانع

## حسین حمزه زاده دانشگاه تبریز

## بهار ۱۴۰۳

## A\*:

Path	Cost	Run Time
(180, 178) -> (180, 177) ->	2	135.60 ms
(180, 176)		
(313, 380) -> (312, 380) ->	13	148.70 ms
(311, 381) -> (310, 382) ->		
$(309, 383) \rightarrow (308, 384) \rightarrow$		
(307, 384) -> (306, 384) ->		
(305, 384) -> (304, 384) ->		
(303, 384) -> (302, 384) ->		
$(301, 384) \rightarrow (300, 384)$		
( <del>635, 675</del> ) -> (635, 676) ->	64	195.90 ms
(634, 677) -> (633, 678) ->		
(632, 679) -> (631, 680) ->		
(630, 681) -> (629, 682) ->		
(628, 683) -> (627, 684) ->		
(627, 685) -> (627, 686) ->		
(627, 687) -> (627, 688) ->		
(627, 689) -> (627, 690) ->		
(627, 691) -> (627, 692) ->		
(627, 693) -> (627, 694) ->		
(627, 695) -> (627, 696) ->		
(627, 697) -> (627, 698) ->		
(627, 699) -> (627, 700) ->		
(627, 701) -> (627, 702) ->		
(627, 703) -> (627, 704) ->		
$(627, 705) \rightarrow (627, 706) \rightarrow$		
$(627, 707) \rightarrow (627, 708) \rightarrow$		
$(627, 709) \rightarrow (627, 710) \rightarrow$		
$(627,711) \rightarrow (627,712) \rightarrow$		
$(627,713) \rightarrow (627,714) \rightarrow$		
$(627, 715) \rightarrow (627, 716) \rightarrow$		
$(627,717) \rightarrow (627,718) \rightarrow$		
(627, 719) -> (627, 720) ->		
(627, 721) -> (627, 722) ->		
(627, 723) -> (627, 724) -> (627, 725) > (627, 726) >		
(627, 725) -> (627, 726) -> (627, 727) -> (627, 728) ->		
(627, 729) -> (627, 730) ->		

(627, 731) -> (627, 732) ->		
$(627, 733) \rightarrow (627, 734) \rightarrow$		
$(627, 735) \rightarrow (627, 736) \rightarrow$		
$(627, 737) \rightarrow (627, 738) \rightarrow$		
(627, 739)		
	86	229 10
(168, 492) -> (168, 493) ->	80	228.10 ms
(167, 494) -> (166, 495) ->		
(165, 496) -> (164, 497) ->		
(163, 498) -> (162, 499) ->		
(161, 500) -> (160, 501) ->		
(159, 502) -> (158, 503) ->		
$(157, 504) \rightarrow (156, 505) \rightarrow$		
(155, 506) -> (154, 507) ->		
$(153, 508) \rightarrow (151, 507) \rightarrow (153, 508) \rightarrow (152, 509) \rightarrow$		
(153, 500) > (152, 507) > (151, 510) -> (150, 511) ->		
(149, 512) -> (148, 513) ->		
$(147, 514) \rightarrow (146, 515) \rightarrow$		
(145, 516) -> (144, 517) ->		
(143, 518) -> (142, 519) ->		
(141, 520) -> (140, 521) ->		
(139, 522) -> (138, 523) ->		
$(137, 524) \rightarrow (136, 525) \rightarrow$		
$(135, 526) \rightarrow (134, 527) \rightarrow$		
$(133, 528) \rightarrow (132, 529) \rightarrow$		
(131, 530) -> (130, 531) ->		
(127, 534) > (128, 533) ->		
(127, 534) -> (126, 535) ->		
(125, 536) -> (124, 537) ->		
$(123, 538) \rightarrow (122, 539) \rightarrow$		
$(121, 540) \rightarrow (120, 541) \rightarrow$		
(119, 542) -> (118, 543) ->		
(117, 544) -> (116, 545) ->		
(115, 546) -> (114, 547) ->		
(113, 548) -> (112, 549) ->		
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$(109, 552) \rightarrow (108, 553) \rightarrow$		
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(103, 558) -> (102, 559) ->		
$(101, 560) \rightarrow (100, 561) \rightarrow$		
$(99, 562) \rightarrow (98, 563) \rightarrow (97,$		
564) -> (96, 565) -> (95, 566) -		
> (94, 567) -> (93, 568) -> (92,		
569) -> (91, 570) -> (90, 571) -		
> (89, 572) -> (88, 573) -> (88,		
574) -> (88, 575) -> (88, 576) -		
> (88, 577) -> (88, 578)		
(284, 166) -> (283, 166) ->	147	471.00 ms
	17/	T/1.00 IIIS
(282, 166) -> (281, 166) ->		
(280, 166) -> (279, 166) ->		
(278, 166) -> (277, 166) ->		
$(276, 166) \rightarrow (275, 166) \rightarrow$		
(274, 166) -> (273, 166) ->		
(272, 166) -> (271, 166) ->		
$(270, 166) \rightarrow (269, 166) \rightarrow$		
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(180, 166) -> (179, 166) ->
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(158, 176) -> (157, 177) ->		
$(156, 178) \rightarrow (155, 179) \rightarrow$		
$(154, 180) \rightarrow (153, 181) \rightarrow$		
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(146, 188) -> (145, 189) ->		
(144, 190) -> (143, 191) ->		
(142, 192) -> (141, 193) ->		
$(140, 194) \rightarrow (139, 194) \rightarrow$		
$(138, 194) \rightarrow (137, 194)$	506	2000 40
(785, 622) -> (784, 622) ->	596	3089.40 ms
(783, 622) -> (782, 622) ->		
(781, 622) -> (780, 622) ->		
$(779, 622) \rightarrow (778, 621) \rightarrow$		
(777, 620) -> (776, 619) ->		
(775, 618) -> (774, 617) ->		
(773, 616) -> (772, 615) ->		
$(771, 614) \rightarrow (770, 613) \rightarrow$		
(769, 612) -> (768, 611) ->		
(767, 610) -> (766, 609) ->		
(765, 608) -> (764, 607) ->		
$(763, 606) \rightarrow (762, 605) \rightarrow$		
(761, 604) -> (760, 603) ->		
(759, 602) -> (758, 601) ->		
(757, 600) -> (756, 599) ->		
(755, 598) -> (754, 597) ->		
$(753, 596) \rightarrow (752, 595) \rightarrow$		
(751, 594) -> (750, 594) ->		
(749, 594) -> (748, 594) ->		
$(747, 594) \rightarrow (746, 594) \rightarrow$		
(745, 594) -> (744, 594) ->		
(743, 594) -> (742, 594) ->		
(741, 594) -> (740, 594) ->		
$(739, 594) \rightarrow (738, 594) \rightarrow$		
(737, 594) -> (736, 594) ->		
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$(729, 594) \rightarrow (728, 594) \rightarrow$		
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$(723, 594) \rightarrow (722, 594) \rightarrow$		
$(721, 594) \rightarrow (720, 594) \rightarrow$		
(719, 594) -> (718, 594) ->		
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(194, 404) -> (193, 403) ->		
(192, 402) -> (191, 401) ->		
(190, 400)		
(847, 79) -> (847, 80) -> (847,	857	1512.20 ms
81) -> (847, 82) -> (847, 83) ->	837	1312.20 IIIS
(847, 84) -> (847, 85) -> (847,		
86) -> (847, 87) -> (847, 88) ->		
$(847, 89) \rightarrow (847, 90) \rightarrow (847, 91)$		
91) -> (847, 92) -> (847, 93) ->		
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(599, 359) \rightarrow (600, 360) \rightarrow
(601, 361) \rightarrow (602, 362) \rightarrow
(603, 363) \rightarrow (604, 364) \rightarrow
(605, 365) \rightarrow (606, 366) \rightarrow
(607, 367) \rightarrow (608, 368) \rightarrow
(609, 369) \rightarrow (610, 370) \rightarrow
(611, 371) \rightarrow (612, 372) \rightarrow
(613, 373) \rightarrow (614, 374) \rightarrow
(615, 375) \rightarrow (616, 376) \rightarrow
(617, 377) \rightarrow (618, 378) \rightarrow
(619, 379) \rightarrow (620, 380) \rightarrow
(621, 381) \rightarrow (622, 382) \rightarrow
(623, 383) \rightarrow (624, 384) \rightarrow
(625, 385) \rightarrow (626, 386) \rightarrow
(627, 387) \rightarrow (628, 388) \rightarrow
(629, 389) -> (630, 390) ->
(631, 391) \rightarrow (632, 392) \rightarrow
(633, 393) -> (634, 394) ->
(635, 395) -> (636, 396) ->
(637, 397) \rightarrow (638, 398) \rightarrow
(639, 399) -> (640, 400) ->
(641, 401) \rightarrow (642, 402) \rightarrow
(643, 403) -> (644, 404) ->
(645, 405) -> (646, 406) ->
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(647, 407) -> (648, 408) ->
(649, 409) \rightarrow (650, 410) \rightarrow
(651, 411) \rightarrow (652, 412) \rightarrow
(653, 413) \rightarrow (654, 414) \rightarrow
(655, 415) \rightarrow (656, 416) \rightarrow
(657, 417) \rightarrow (658, 418) \rightarrow
(659, 419) \rightarrow (660, 420) \rightarrow
(661, 421) \rightarrow (662, 422) \rightarrow
(663, 423) \rightarrow (664, 424) \rightarrow
(665, 425) \rightarrow (666, 426) \rightarrow
(667, 427) -> (668, 428) ->
(669, 429) \rightarrow (670, 430) \rightarrow
(671, 431) \rightarrow (672, 432) \rightarrow
(673, 433) \rightarrow (674, 434) \rightarrow
(675, 435) -> (676, 436) ->
(677, 437) \rightarrow (678, 438) \rightarrow
(679, 439) \rightarrow (680, 440) \rightarrow
(681, 441) \rightarrow (682, 442) \rightarrow
(683, 443) -> (684, 444) ->
(685, 445) \rightarrow (686, 446) \rightarrow
(687, 447) -> (688, 448) ->
(689, 449) \rightarrow (690, 450) \rightarrow
(691, 451) \rightarrow (692, 452) \rightarrow
(693, 453) \rightarrow (694, 454) \rightarrow
(695, 455) \rightarrow (696, 456) \rightarrow
(697, 457) \rightarrow (698, 458) \rightarrow
(699, 459) \rightarrow (700, 460) \rightarrow
(701, 461) \rightarrow (702, 462) \rightarrow
(703, 463) \rightarrow (704, 464) \rightarrow
(705, 465) \rightarrow (706, 466) \rightarrow
(707, 467) \rightarrow (708, 468) \rightarrow
(709, 469) \rightarrow (710, 470) \rightarrow
(711, 471) \rightarrow (712, 472) \rightarrow
(713, 473) \rightarrow (714, 474) \rightarrow
(715, 475) \rightarrow (716, 476) \rightarrow
(717, 477) \rightarrow (718, 478) \rightarrow
(719, 479) \rightarrow (720, 480) \rightarrow
(721, 481) \rightarrow (722, 482) \rightarrow
(723, 483) \rightarrow (724, 484) \rightarrow
(725, 485) \rightarrow (726, 486) \rightarrow
(727, 487) \rightarrow (728, 488) \rightarrow
(729, 489) \rightarrow (730, 490) \rightarrow
(731, 491) \rightarrow (732, 492) \rightarrow
(733, 493) \rightarrow (734, 494) \rightarrow
(735, 495) \rightarrow (736, 496) \rightarrow
(737, 497) -> (738, 498) ->
(739, 499) \rightarrow (740, 500) \rightarrow
(741, 501) \rightarrow (742, 502) \rightarrow
(743, 503) \rightarrow (744, 504) \rightarrow
(745, 505) \rightarrow (746, 506) \rightarrow
(747, 507) \rightarrow (748, 508) \rightarrow
(749, 509) \rightarrow (750, 510) \rightarrow
(751, 511) \rightarrow (752, 512) \rightarrow
(753, 513) \rightarrow (754, 514) \rightarrow
(755, 515) \rightarrow (756, 516) \rightarrow
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(757, 517) \rightarrow (758, 518) \rightarrow
(759, 519) \rightarrow (760, 520) \rightarrow
(761, 521) \rightarrow (762, 522) \rightarrow
(763, 523) \rightarrow (764, 524) \rightarrow
(765, 525) \rightarrow (766, 526) \rightarrow
(767, 527) \rightarrow (768, 528) \rightarrow
(769, 529) \rightarrow (770, 530) \rightarrow
(771, 531) \rightarrow (772, 532) \rightarrow
(773, 533) \rightarrow (774, 534) \rightarrow
(775, 535) \rightarrow (776, 536) \rightarrow
(777, 537) \rightarrow (778, 538) \rightarrow
(779, 539) \rightarrow (780, 540) \rightarrow
(781, 541) \rightarrow (782, 542) \rightarrow
(783, 543) \rightarrow (784, 544) \rightarrow
(785, 545) \rightarrow (786, 546) \rightarrow
(787, 547) \rightarrow (788, 548) \rightarrow
(789, 549) \rightarrow (790, 550) \rightarrow
(791, 551) \rightarrow (792, 552) \rightarrow
(793, 553) \rightarrow (794, 554) \rightarrow
(795, 555) \rightarrow (796, 556) \rightarrow
(797, 557) \rightarrow (798, 558) \rightarrow
(799, 559) \rightarrow (800, 560) \rightarrow
(801, 561) \rightarrow (802, 562) \rightarrow
(803, 563) \rightarrow (804, 564) \rightarrow
(805, 565) \rightarrow (806, 566) \rightarrow
(807, 567) \rightarrow (808, 568) \rightarrow
(809, 569) \rightarrow (810, 570) \rightarrow
(811, 571) \rightarrow (812, 572) \rightarrow
(813, 573) \rightarrow (814, 574) \rightarrow
(815, 575) \rightarrow (816, 576) \rightarrow
(817, 577) \rightarrow (818, 578) \rightarrow
(819, 579) \rightarrow (820, 580) \rightarrow
(821, 581) \rightarrow (822, 582) \rightarrow
(823, 583) \rightarrow (824, 584) \rightarrow
(825, 585) \rightarrow (826, 586) \rightarrow
(827, 587) \rightarrow (828, 588) \rightarrow
(829, 589) \rightarrow (830, 590) \rightarrow
(831, 591) \rightarrow (832, 592) \rightarrow
(833, 593) \rightarrow (834, 594) \rightarrow
(835, 595) -> (836, 596) ->
(837, 597) -> (838, 598) ->
(839, 599) -> (840, 600) ->
(841, 601) -> (842, 602) ->
(843, 603) -> (844, 604) ->
(845, 605) -> (846, 606) ->
(847, 607) -> (848, 608) ->
(849, 609) -> (850, 610) ->
(851, 611) \rightarrow (852, 612) \rightarrow
(853, 613) \rightarrow (854, 614) \rightarrow
(855, 615) -> (856, 616) ->
(857, 617) \rightarrow (858, 618) \rightarrow
(859, 619) \rightarrow (860, 620) \rightarrow
(861, 621) \rightarrow (862, 622) \rightarrow
(863, 623) -> (864, 624) ->
(865, 625) \rightarrow (866, 626) \rightarrow
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(867, 627) -> (868, 628) ->
(869, 629) \rightarrow (870, 630) \rightarrow
(871, 631) \rightarrow (872, 632) \rightarrow
(873, 633) \rightarrow (874, 634) \rightarrow
(875, 635) \rightarrow (876, 636) \rightarrow
(877, 637) \rightarrow (878, 638) \rightarrow
(879, 639) -> (880, 640) ->
(881, 641) \rightarrow (882, 642) \rightarrow
(883, 643) -> (884, 644) ->
(885, 645) -> (886, 646) ->
(887, 647) \rightarrow (888, 648) \rightarrow
(889, 649) -> (890, 650) ->
(891, 651) \rightarrow (892, 652) \rightarrow
(893, 653) -> (894, 654) ->
(895, 655) -> (896, 656) ->
(897, 657) \rightarrow (898, 658) \rightarrow
(899, 659) -> (900, 660) ->
(901, 661) \rightarrow (902, 662) \rightarrow
(903, 663) \rightarrow (904, 664) \rightarrow
(905, 665) \rightarrow (906, 666) \rightarrow
(907, 667) -> (908, 668) ->
(909, 669) \rightarrow (910, 670) \rightarrow
(911, 671) \rightarrow (912, 672) \rightarrow
(913, 673) \rightarrow (914, 674) \rightarrow
(915, 675) \rightarrow (916, 676) \rightarrow
(917, 677) \rightarrow (918, 678) \rightarrow
(919, 679) -> (920, 680) ->
(921, 681) \rightarrow (922, 682) \rightarrow
(923, 683) \rightarrow (924, 684) \rightarrow
(925, 685) \rightarrow (926, 686) \rightarrow
(927, 687) \rightarrow (928, 688) \rightarrow
(929, 689) \rightarrow (930, 690) \rightarrow
(931, 691) \rightarrow (932, 692) \rightarrow
(933, 693) \rightarrow (934, 694) \rightarrow
(935, 695) -> (936, 696) ->
(937, 697) -> (938, 698) ->
(939, 699) -> (940, 700) ->
(941, 701) \rightarrow (942, 702) \rightarrow
(943, 703) \rightarrow (944, 704) \rightarrow
(945, 705) \rightarrow (946, 706) \rightarrow
(947, 707) -> (948, 708) ->
(949, 709) \rightarrow (950, 710) \rightarrow
(951, 711) \rightarrow (952, 712) \rightarrow
(953, 713) \rightarrow (954, 714) \rightarrow
(955, 715) \rightarrow (956, 716) \rightarrow
(957, 717) \rightarrow (958, 718) \rightarrow
(959, 719) \rightarrow (960, 720) \rightarrow
(961, 721) \rightarrow (962, 722) \rightarrow
(963, 723) \rightarrow (964, 724) \rightarrow
(965, 725) \rightarrow (966, 726) \rightarrow
(967, 727) \rightarrow (968, 728) \rightarrow
(969, 729) \rightarrow (970, 730) \rightarrow
(971, 731) \rightarrow (972, 732) \rightarrow
(973, 733) \rightarrow (974, 734) \rightarrow
(975, 735) \rightarrow (976, 736) \rightarrow
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(977, 737) \rightarrow (978, 738) \rightarrow
(979, 739) \rightarrow (980, 740) \rightarrow
(981, 741) \rightarrow (982, 742) \rightarrow
(983, 743) \rightarrow (984, 744) \rightarrow
(985, 745) -> (986, 746) ->
(987, 747) \rightarrow (988, 748) \rightarrow
(989, 749) \rightarrow (990, 750) \rightarrow
(991, 751) \rightarrow (992, 752) \rightarrow
(993, 753) \rightarrow (994, 754) \rightarrow
(995, 755) \rightarrow (996, 756) \rightarrow
(997, 757) \rightarrow (998, 758) \rightarrow
(999, 759) \rightarrow (1000, 760) \rightarrow
(1001, 761) \rightarrow (1002, 762) \rightarrow
(1003, 763) \rightarrow (1004, 764) \rightarrow
(1005, 765) \rightarrow (1005, 766) \rightarrow
(1005, 767) \rightarrow (1005, 768) \rightarrow
(1005, 769) \rightarrow (1005, 770) \rightarrow
(1005, 771) \rightarrow (1005, 772) \rightarrow
(1005, 773) \rightarrow (1005, 774) \rightarrow
(1005, 775) \rightarrow (1005, 776) \rightarrow
(1005, 777) \rightarrow (1005, 778) \rightarrow
(1005, 779) \rightarrow (1005, 780) \rightarrow
(1005, 781) \rightarrow (1005, 782) \rightarrow
(1005, 783) \rightarrow (1005, 784) \rightarrow
(1005, 785) \rightarrow (1005, 786) \rightarrow
(1005, 787) \rightarrow (1005, 788) \rightarrow
(1005, 789) \rightarrow (1005, 790) \rightarrow
(1005, 791) \rightarrow (1005, 792) \rightarrow
(1005, 793) \rightarrow (1005, 794) \rightarrow
(1005, 795) \rightarrow (1005, 796) \rightarrow
(1005, 797) \rightarrow (1005, 798) \rightarrow
(1005, 799) \rightarrow (1005, 800) \rightarrow
(1005, 801) \rightarrow (1005, 802) \rightarrow
(1005, 803) \rightarrow (1005, 804) \rightarrow
(1005, 805) \rightarrow (1005, 806) \rightarrow
(1005, 807) \rightarrow (1005, 808) \rightarrow
(1005, 809) \rightarrow (1005, 810) \rightarrow
(1005, 811) \rightarrow (1005, 812) \rightarrow
(1005, 813) \rightarrow (1005, 814) \rightarrow
(1005, 815) \rightarrow (1005, 816) \rightarrow
(1005, 817) \rightarrow (1005, 818) \rightarrow
(1005, 819) \rightarrow (1005, 820) \rightarrow
(1005, 821) \rightarrow (1005, 822) \rightarrow
(1005, 823) \rightarrow (1005, 824) \rightarrow
(1005, 825) \rightarrow (1005, 826) \rightarrow
(1005, 827) \rightarrow (1005, 828) \rightarrow
(1005, 829) \rightarrow (1005, 830) \rightarrow
(1005, 831) \rightarrow (1005, 832) \rightarrow
(1005, 833) \rightarrow (1005, 834) \rightarrow
(1005, 835) \rightarrow (1005, 836) \rightarrow
(1005, 837) \rightarrow (1005, 838) \rightarrow
(1005, 839) \rightarrow (1005, 840) \rightarrow
(1005, 841) \rightarrow (1005, 842) \rightarrow
(1005, 843) \rightarrow (1005, 844) \rightarrow
(1005, 845) \rightarrow (1005, 846) \rightarrow
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(1005, 847) \rightarrow (1005, 848) \rightarrow
(1005, 849) \rightarrow (1005, 850) \rightarrow
(1005, 851) \rightarrow (1005, 852) \rightarrow
(1005, 853) \rightarrow (1005, 854) \rightarrow
(1005, 855) \rightarrow (1005, 856) \rightarrow
(1005, 857) \rightarrow (1005, 858) \rightarrow
(1005, 859) \rightarrow (1005, 860) \rightarrow
(1005, 861) \rightarrow (1005, 862) \rightarrow
(1005, 863) \rightarrow (1005, 864) \rightarrow
(1005, 865) \rightarrow (1005, 866) \rightarrow
(1005, 867) \rightarrow (1005, 868) \rightarrow
(1005, 869) \rightarrow (1005, 870) \rightarrow
(1005, 871) \rightarrow (1005, 872) \rightarrow
(1005, 873) \rightarrow (1005, 874) \rightarrow
(1005, 875) \rightarrow (1005, 876) \rightarrow
(1005, 877) \rightarrow (1005, 878) \rightarrow
(1005, 879) \rightarrow (1005, 880) \rightarrow
(1005, 881) \rightarrow (1005, 882) \rightarrow
(1005, 883) \rightarrow (1005, 884) \rightarrow
(1005, 885) \rightarrow (1005, 886) \rightarrow
(1005, 887) \rightarrow (1005, 888) \rightarrow
(1005, 889) \rightarrow (1005, 890) \rightarrow
(1005, 891) \rightarrow (1005, 892) \rightarrow
(1005, 893) \rightarrow (1005, 894) \rightarrow
(1005, 895) \rightarrow (1005, 896) \rightarrow
(1005, 897) \rightarrow (1005, 898) \rightarrow
(1005, 899) \rightarrow (1005, 900) \rightarrow
(1005, 901) \rightarrow (1005, 902) \rightarrow
(1005, 903) \rightarrow (1005, 904) \rightarrow
(1005, 905) \rightarrow (1005, 906) \rightarrow
(1005, 907) \rightarrow (1005, 908) \rightarrow
(1005, 909) \rightarrow (1005, 910) \rightarrow
(1005, 911) \rightarrow (1005, 912) \rightarrow
(1005, 913) \rightarrow (1005, 914) \rightarrow
(1005, 915) \rightarrow (1005, 916) \rightarrow
(1005, 917) \rightarrow (1005, 918) \rightarrow
(1005, 919) \rightarrow (1005, 920) \rightarrow
(1005, 921) \rightarrow (1005, 922) \rightarrow
(1005, 923) \rightarrow (1005, 924) \rightarrow
(1005, 925) \rightarrow (1005, 926) \rightarrow
(1005, 927) \rightarrow (1005, 928) \rightarrow
(1005, 929) \rightarrow (1005, 930) \rightarrow
(1005, 931) \rightarrow (1005, 932) \rightarrow
(1005, 933) \rightarrow (1005, 934) \rightarrow
(1005, 935) \rightarrow (1005, 936) \rightarrow
(1005, 937) \rightarrow (1005, 938) \rightarrow
(1005, 939) \rightarrow (1005, 940) \rightarrow
(1005, 941) \rightarrow (1005, 942) \rightarrow
(1005, 943) \rightarrow (1005, 944) \rightarrow
(1005, 945) \rightarrow (1005, 946) \rightarrow
(1005, 947) \rightarrow (1005, 948) \rightarrow
(1005, 949) \rightarrow (1005, 950) \rightarrow
(1005, 951) \rightarrow (1005, 952) \rightarrow
(1005, 953) \rightarrow (1005, 954) \rightarrow
(1005, 955) \rightarrow (1005, 956) \rightarrow
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(1005, 957) -> (1005, 958) ->	
$(1005, 959) \rightarrow (1005, 960) \rightarrow$	
$(1005, 961) \rightarrow (1005, 962) \rightarrow$	
$(1005, 963) \rightarrow (1005, 964) \rightarrow$	
(1005, 965) -> (1005, 966) ->	
$(1005, 967) \rightarrow (1005, 968) \rightarrow$	
(1005, 969) -> (1005, 970) ->	
$(1005, 971) \rightarrow (1005, 972) \rightarrow$	
(1005, 973) -> (1005, 974) ->	
(1005, 975) -> (1005, 976) ->	
(1005, 977) -> (1005, 978) ->	
(1005, 979) -> (1005, 980) ->	
(1005, 981) -> (1005, 982) ->	
(1005, 983) -> (1005, 984) ->	
(1005, 985) -> (1005, 986) ->	
(1005, 987) -> (1005, 988) ->	
(1005, 989) -> (1005, 990) ->	
(1005, 991) -> (1005, 992) ->	
(1005, 993) -> (1005, 994) ->	
(1005, 995) -> (1005, 996) ->	
(1005, 997) -> (1005, 998) ->	
(1005, 999) -> (1005, 1000) ->	
$(1005, 1001) \rightarrow (1005, 1002)$	

## GBFS:

Path	Cost	Time
(180, 178) -> (180, 177) ->	2	132.80 ms
(180, 176)		
(313, 380) -> (312, 380) ->	20	121.90 ms
(311, 380) -> (310, 379) ->		
(309, 379) -> (308, 378) ->		
(307, 378) -> (306, 378) ->		
(305, 378) -> (304, 379) ->		
(304, 380) -> (303, 381) ->		
(302, 381) -> (301, 380) ->		
(300, 380) -> (299, 381) ->		
(298, 382) -> (298, 383) ->		
(298, 384) -> (299, 385) ->		
(300, 384)		
(635, 675) -> (634, 675) ->	85	191.60 ms
(633, 676) -> (632, 677) ->		
(631, 678) -> (630, 679) ->		
(629, 680) -> (628, 681) ->		
(627, 682) -> (626, 683) ->		
(627, 684) -> (628, 685) ->		
(627, 686) -> (626, 687) ->		
(625, 688) -> (625, 689) ->		
(624, 690) -> (623, 691) ->		
(622, 692) -> (621, 693) ->		
(620, 694) -> (619, 694) ->		
(618, 695) -> (617, 695) ->		

(616, 696) -> (615, 697) ->		
(614, 698) -> (613, 698) ->		
(612, 699) -> (612, 700) ->		
(612, 701) -> (611, 702) ->		
(612, 703) -> (613, 704) ->		
$(612, 705) \rightarrow (611, 705) \rightarrow$		
(610, 706) -> (609, 707) ->		
(609, 708) -> (608, 709) ->		
(607, 710) -> (606, 711) ->		
(605, 712) -> (606, 713) ->		
(607, 714) -> (607, 715) ->		
(606, 716) -> (605, 717) ->		
(606, 718) -> (606, 719) ->		
$(607, 720) \rightarrow (608, 721) \rightarrow$		
$(609, 722) \rightarrow (610, 723) \rightarrow$		
(610, 724) -> (609, 725) ->		
$(609, 726) \rightarrow (609, 727) \rightarrow$		
$(609, 728) \rightarrow (609, 729) \rightarrow$		
(609, 730) -> (610, 731) ->		
$(611, 732) \rightarrow (612, 733) \rightarrow$		
(613, 734) -> (614, 734) ->		
$(615, 735) \rightarrow (616, 736) \rightarrow$		
$(617, 736) \rightarrow (618, 737) \rightarrow$		
(619, 738) -> (619, 739) ->		
(620, 740) -> (621, 739) ->		
$(622, 740) \rightarrow (623, 741) \rightarrow$		
$(624, 742) \rightarrow (625, 742) \rightarrow$		
$(626, 743) \rightarrow (627, 743) \rightarrow$		
$(628, 742) \rightarrow (629, 741) \rightarrow$		
(629, 740) -> (629, 739) ->		
$(628, 738) \rightarrow (627, 739)$		
(168, 492) -> (168, 493) ->	95	165.60 ms
(168, 494) -> (168, 495) ->		
(168, 496) -> (168, 497) ->		
(168, 498) -> (167, 499) ->		
(166, 500) -> (165, 501) ->		
(164, 502) -> (163, 503) ->		
(162, 504) -> (161, 505) ->		
(162, 564) = (161, 563) = (160, 506) -> (159, 507) ->		
(158, 508) -> (157, 509) ->		
(156, 510) -> (155, 511) ->		
(154, 512) -> (153, 513) ->		
(154, 512) -> (153, 513) ->		
(150, 516) -> (149, 517) ->		
(130, 510) -> (149, 517) ->		
(144, 522) > (143, 521) ->		
(144, 522) -> (143, 523) ->		
(142, 524) -> (141, 525) ->		
(140, 526) -> (139, 527) ->		
(138, 528) -> (137, 529) ->		
(136, 530) -> (135, 531) ->		
(134, 532) -> (133, 533) ->		
1 (100 504) > (101 505) >	I and the second	
$(132, 534) \rightarrow (131, 535) \rightarrow$		
(132, 534) -> (131, 535) -> (130, 536) -> (129, 537) -> (128, 538) -> (127, 539) ->		

(126, 540) -> (125, 541) ->		
$(124, 542) \rightarrow (123, 543) \rightarrow$		
$(121, 512)$ $(123, 513)$ $(122, 544) \rightarrow (121, 545) \rightarrow$		
(120, 546) -> (119, 547) ->		
(118, 548) -> (117, 549) ->		
(116, 550) -> (115, 551) ->		
(114, 552) -> (113, 553) ->		
(112, 554) -> (111, 555) ->		
(110, 556) -> (109, 557) ->		
$(108, 558) \rightarrow (107, 559) \rightarrow$		
$(106, 560) \rightarrow (105, 561) \rightarrow$		
$(104, 562) \rightarrow (103, 563) \rightarrow$		
$(102, 564) \rightarrow (102, 565) \rightarrow$		
(101, 566) -> (100, 566) ->		
$(99, 567) \rightarrow (98, 568) \rightarrow (97,$		
569) -> (96, 570) -> (95, 571) -		
> (95, 572) -> (94, 573) -> (94,		
574) -> (94, 575) -> (94, 576) -		
> (94, 577) -> (94, 578) -> (93,		
579) -> (92, 580) -> (91, 581) -		
> (90, 580) -> (90, 579) -> (90,		
578) -> (89, 577) -> (88, 578)	1=0	400.00
(284, 166) -> (284, 167) ->	179	408.90 ms
$(284, 168) \rightarrow (283, 169) \rightarrow$		
$(282, 170) \rightarrow (281, 171) \rightarrow$		
$(280, 172) \rightarrow (279, 173) \rightarrow$		
$(278, 174) \rightarrow (277, 175) \rightarrow$		
$(276, 176) \rightarrow (275, 177) \rightarrow$		
$(274, 178) \rightarrow (274, 179) \rightarrow$		
$(274, 180) \rightarrow (274, 181) \rightarrow$		
$(273, 182) \rightarrow (272, 183) \rightarrow$		
$(271, 184) \rightarrow (270, 185) \rightarrow$		
(269, 186) -> (268, 187) ->		
(267, 188) -> (266, 189) ->		
(266, 190) -> (265, 191) ->		
$(264, 192) \rightarrow (263, 193) \rightarrow$		
$(262, 194) \rightarrow (261, 195) \rightarrow$		
(260, 195) -> (259, 196) ->		
(258, 196) -> (257, 196) ->		
(256, 196) -> (255, 196) ->		
(254, 195) -> (253, 194) ->		
$(252, 193) \rightarrow (251, 194) \rightarrow (252, 193) \rightarrow (251, 194) \rightarrow$		
(250, 195) -> (249, 196) ->		
(248, 197) -> (247, 198) ->		
(246, 199) -> (245, 200) ->		
(244, 201) -> (243, 202) ->		
(242, 201) -> (241, 200) ->		
(240, 199) -> (239, 200) ->		
$(238, 201) \rightarrow (238, 202) \rightarrow$		
$(237, 203) \rightarrow (236, 204) \rightarrow$		
$(235, 204) \rightarrow (234, 205) \rightarrow$		
(233, 206) -> (232, 207) ->		I .
$(231, 208) \rightarrow (230, 209) \rightarrow$		
(231, 208) -> (230, 209) ->		

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(226, 214) \rightarrow (225, 215) \rightarrow
(224, 215) \rightarrow (223, 216) \rightarrow
(222, 217) \rightarrow (221, 218) \rightarrow
(221, 219) \rightarrow (220, 220) \rightarrow
(219, 221) \rightarrow (218, 221) \rightarrow
(217, 222) \rightarrow (216, 223) \rightarrow
(215, 224) \rightarrow (214, 224) \rightarrow
(213, 225) \rightarrow (212, 226) \rightarrow
(211, 227) \rightarrow (210, 227) \rightarrow
(209, 227) \rightarrow (208, 227) \rightarrow
(207, 226) \rightarrow (206, 225) \rightarrow
(205, 224) \rightarrow (204, 223) \rightarrow
(203, 223) \rightarrow (202, 223) \rightarrow
(201, 223) \rightarrow (200, 222) \rightarrow
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(141, 199) -> (141, 198) ->
(140, 197) \rightarrow (139, 196) \rightarrow
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(139, 195) -> (139, 194) ->		
$(138, 193) \rightarrow (137, 194)$		
(785, 622) -> (784, 622) ->	632	3084.60 ms
(783, 622) -> (782, 622) ->		
(781, 622) -> (780, 621) ->		
(779, 620) -> (778, 619) ->		
(777, 618) -> (776, 617) ->		
$(775, 616) \rightarrow (774, 615) \rightarrow$		
$(773, 614) \rightarrow (774, 613) \rightarrow (773, 614) \rightarrow (772, 613) \rightarrow$		
$(771, 612) \rightarrow (770, 611) \rightarrow (760, 610) \rightarrow (768, 600) \rightarrow (76$		
(769, 610) -> (768, 609) ->		
$(767, 608) \rightarrow (766, 607) \rightarrow$		
$(765, 606) \rightarrow (764, 605) \rightarrow$		
$(763, 604) \rightarrow (762, 603) \rightarrow$		
$(761, 602) \rightarrow (760, 601) \rightarrow$		
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(741, 589) -> (740, 589) ->		
(739, 588) -> (738, 588) ->		
(737, 589) -> (736, 589) ->		
(735, 589) -> (734, 588) ->		
$(733, 588) \rightarrow (732, 589) \rightarrow$		
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$(242, 452) \rightarrow (241, 451) \rightarrow$		
(240, 450) -> (239, 449) ->		
$(238, 448) \rightarrow (237, 447) \rightarrow$		
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(240, 434) -> (240, 433) ->		
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(194, 396) -> (193, 397) ->		
(192, 398) -> (191, 398) ->		
(190, 398) -> (189, 399) ->		
(190, 400)		
$(847, 79) \rightarrow (847, 80) \rightarrow (847,$	1005	2821.50 ms
81) -> (847, 82) -> (847, 83) ->		
$(847, 84) \rightarrow (847, 85) \rightarrow (847,$		
86) -> (847, 87) -> (847, 88) ->		
(846, 89) -> (845, 90) -> (844,		
91) -> (843, 92) -> (842, 93) ->		
$(841, 94) \rightarrow (840, 95) \rightarrow (839,$		
96) -> (838, 97) -> (837, 98) ->		
(836, 99) -> (835, 100) ->		
(834, 101) -> (833, 102) ->		
(832, 103) -> (831, 104) ->		
(032, 103) - (031, 104) -		

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(830, 105) -> (829, 106) ->
(828, 107) \rightarrow (827, 108) \rightarrow
(826, 109) \rightarrow (825, 110) \rightarrow
(824, 111) \rightarrow (823, 112) \rightarrow
(822, 113) \rightarrow (821, 114) \rightarrow
(820, 115) -> (819, 116) ->
(818, 117) \rightarrow (817, 118) \rightarrow
(816, 119) \rightarrow (815, 120) \rightarrow
(814, 121) \rightarrow (813, 122) \rightarrow
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(800, 135) \rightarrow (799, 136) \rightarrow
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(741, 213) \rightarrow (740, 214) \rightarrow
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(739, 215) \rightarrow (738, 216) \rightarrow
(737, 217) \rightarrow (736, 218) \rightarrow
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(570, 911) -> (569, 910) ->
(568, 909) \rightarrow (567, 908) \rightarrow
(566, 907) -> (565, 906) ->
(564, 905) \rightarrow (563, 904) \rightarrow
(562, 903) \rightarrow (561, 902) \rightarrow
(560, 901) -> (559, 900) ->
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(548, 889) -> (548, 888) ->
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(544, 883) -> (543, 882) ->
(542, 881) -> (541, 880) ->
(540, 879) -> (539, 878) ->
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(536, 875) \rightarrow (535, 874) \rightarrow
(534, 873) \rightarrow (533, 872) \rightarrow
(532, 871) \rightarrow (531, 870) \rightarrow
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(528, 867) -> (527, 866) ->
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(472, 809) \rightarrow (471, 808) \rightarrow
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(458, 781) \rightarrow (457, 780) \rightarrow
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(449, 771) \rightarrow (448, 770) \rightarrow
(447, 769) -> (446, 768) ->
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(445, 767) -> (444, 766) ->
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(419, 719) \rightarrow (419, 718) \rightarrow
(419, 717) \rightarrow (419, 716) \rightarrow
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(419, 703) \rightarrow (418, 702) \rightarrow
(417, 701) \rightarrow (416, 700) \rightarrow
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(413, 697) \rightarrow (412, 696) \rightarrow
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(396, 677) \rightarrow (395, 676) \rightarrow
(394, 675) -> (393, 674) ->
(392, 673) \rightarrow (391, 672) \rightarrow
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(386, 668) \rightarrow (385, 667) \rightarrow
(384, 666) -> (383, 665) ->
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(380, 662) \rightarrow (379, 661) \rightarrow
(378, 660) \rightarrow (377, 659) \rightarrow
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(117, 347) -> (116, 346) ->
(115, 345) \rightarrow (114, 344) \rightarrow
(113, 343) \rightarrow (112, 342) \rightarrow
(111, 341) -> (110, 340) ->
(109, 339) \rightarrow (108, 338) \rightarrow
(107, 337) \rightarrow (106, 336) \rightarrow
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313) -> (98, 312) -> (98, 311) -
> (98, 310) -> (98, 309) -> (98,
308) -> (98, 307) -> (97, 306) -
> (96, 305) -> (95, 304) -> (95,
303) -> (95, 302) -> (94, 301) -
> (94, 300) -> (94, 299) -> (94,
298) -> (93, 297) -> (93, 296) -
> (93, 295) \rightarrow (92, 294) \rightarrow (91,
(293) \rightarrow (90, 292) \rightarrow (89, 291) -
> (88, 291) -> (87, 292) -> (86,
291) -> (85, 290) -> (85, 289) -
> (86, 288) -> (87, 287) -> (86,
286) -> (86, 285) -> (85, 284) -
> (84, 283) \rightarrow (83, 282) \rightarrow (82,
281) -> (81, 280) -> (80, 280) -
> (79, 279) -> (78, 278) -> (77,
278) -> (76, 278) -> (75, 278) -
> (74, 277) \rightarrow (74, 276) \rightarrow (73,
(275) \rightarrow (73, 274) \rightarrow (73, 273) -
> (72, 272) \rightarrow (71, 271) \rightarrow (70,
(270) \rightarrow (69, 269) \rightarrow (68, 268)
> (67, 268) -> (66, 268) -> (65,
268) -> (64, 268) -> (63, 269) -
> (62, 268) -> (61, 267) -> (60,
266) -> (59, 265) -> (58, 264) -
> (57, 264) -> (56, 264) -> (55,
263) -> (54, 262) -> (54, 261) -
> (55, 260) -> (55, 259) -> (54,
258) -> (53, 258) -> (52, 258) -
> (51, 257) -> (51, 256) -> (51,
(255) \rightarrow (50, 254) \rightarrow (49, 253) -
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229) -> (59, 228) -> (59, 227) -
> (58, 226) -> (58, 225) -> (57,
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224) -> (56, 223) -> (55, 222) -
> (55, 221) -> (55, 220) -> (55,
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> (55, 216) -> (55, 215) -> (55,
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209) -> (56, 208) -> (56, 207) -
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204) -> (57, 203) -> (56, 202) -
> (55, 201) -> (54, 201) -> (53,
201) -> (52, 200) -> (52, 199) -
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191) -> (45, 190) -> (46, 189) -
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186) -> (45, 185) -> (46, 184) -
> (45, 183) \rightarrow (44, 182) \rightarrow (43,
181) -> (42, 180) -> (42, 179) -
> (41, 178) -> (40, 177) -> (39,
176) -> (39, 175) -> (38, 174) -
> (37, 173) -> (36, 172) -> (35,
171) -> (34, 170) -> (33, 169) -
> (33, 168) -> (32, 167) -> (31,
166) -> (30, 166) -> (29, 166) -
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163) -> (30, 162) -> (31, 161) -
> (30, 160) -> (29, 159) -> (29,
158) -> (28, 157) -> (27, 156) -
> (27, 155) \rightarrow (27, 154) \rightarrow (26,
153) -> (25, 152) -> (24, 151) -
> (23, 150) -> (23, 149) -> (22,
148) -> (21, 147) -> (21, 146) -
> (20, 145) -> (19, 146) -> (18,
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> (15, 137) -> (15, 136) -> (16,
135) -> (15, 134) -> (15, 133) -
> (14, 132) -> (13, 131) -> (13,
130) \rightarrow (13, 129) \rightarrow (12, 128) -
> (11, 127) -> (11, 126) -> (11,
125) -> (10, 124) -> (9, 123) ->
(8, 122) \rightarrow (7, 121) \rightarrow (7, 120)
-> (6, 119) -> (5, 118) -> (4,
117) -> (5, 116) -> (6, 116) ->
(7, 115) \rightarrow (8, 114) \rightarrow (9, 113)
-> (10, 112) -> (10, 111) ->
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108) -> (13, 107) -> (13, 106) -
> (14, 105) -> (15, 104) -> (16,
103) -> (17, 102) -> (18, 101) -
> (19, 100) -> (20, 99) -> (21,
99) \rightarrow (22, 98) \rightarrow (22, 97) \rightarrow
(21, 96) \rightarrow (21, 95) \rightarrow (20, 94)
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-> (20, 93) -> (21, 92) -> (22,
92) \rightarrow (23, 91) \rightarrow (24, 91) \rightarrow
(25, 91) \rightarrow (26, 90) \rightarrow (25, 89)
-> (26, 88) -> (25, 87) -> (26,
86) -> (27, 85) -> (28, 85) ->
(29, 84) \rightarrow (29, 83) \rightarrow (29, 82)
-> (28, 81) -> (28, 80) -> (28,
79) -> (27, 78) -> (27, 77) ->
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-> (25, 74) -> (26, 73) -> (27,
72) \rightarrow (28, 71) \rightarrow (29, 70) \rightarrow
(30, 69) \rightarrow (30, 68) \rightarrow (31, 67)
-> (32, 67) -> (33, 67) -> (34,
68) \rightarrow (35, 68) \rightarrow (36, 68) \rightarrow
(37, 67) \rightarrow (38, 67) \rightarrow (39, 67)
-> (40, 67) -> (41, 67) -> (42,
68) -> (43, 68) -> (44, 69) ->
(45, 69) \rightarrow (46, 69) \rightarrow (47, 69)
-> (48, 69) -> (49, 69) -> (50,
70) \rightarrow (51, 71) \rightarrow (52, 71) \rightarrow
(53, 70) \rightarrow (53, 69) \rightarrow (54, 68)
-> (53, 67) -> (52, 66) -> (51,
65) -> (50, 64) -> (49, 63) ->
(49, 62) \rightarrow (48, 61) \rightarrow (48, 60)
-> (48, 59) -> (47, 58) -> (47,
57) -> (47, 56) -> (48, 55) ->
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-> (52, 54) -> (52, 53) -> (51,
52) \rightarrow (52, 51) \rightarrow (53, 50) \rightarrow
(54, 49) \rightarrow (55, 48) \rightarrow (56, 47)
-> (57, 47) -> (58, 46) -> (58,
45) -> (59, 44) -> (60, 43) ->
(59, 42) \rightarrow (58, 41) \rightarrow (58, 40)
-> (57, 39) -> (57, 38) -> (57, 38)
37) -> (57, 36) -> (56, 35) ->
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-> (61, 31) -> (62, 32) -> (63,
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(66, 28) \rightarrow (65, 27) \rightarrow (65, 26)
-> (66, 25) -> (67, 25) -> (68,
24) -> (69, 24) -> (70, 23) ->
(71, 23) \rightarrow (72, 23) \rightarrow (73, 22)
-> (74, 21) -> (74, 20) -> (75,
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(78, 19) \rightarrow (79, 19) \rightarrow (80, 19)
-> (81, 18) -> (82, 18) -> (83,
18) -> (84, 19) -> (85, 19) ->
(86, 19) \rightarrow (87, 18) \rightarrow (88, 17)
-> (88, 16) -> (88, 15) -> (89,
14) -> (90, 13) -> (91, 12) ->
(92, 12) \rightarrow (93, 13) \rightarrow (94, 14)
-> (95, 14) -> (96, 14) -> (97,
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14) -> (98, 14) -> (99, 14) ->		
$(100, 13) \rightarrow (101, 14) \rightarrow (102,$		
14) -> (103, 13) -> (103, 12) ->		
$(103, 11) \rightarrow (104, 10) \rightarrow (105, 12)$		
9) -> (104, 8) -> (105, 7) ->		
$(105, 6) \rightarrow (106, 5) \rightarrow (106, 4)$		
-> (107, 3) -> (106, 2) -> (106,		
1) -> (105, 0) -> (104, 1) ->		
$(103, 0) \rightarrow (102, 1)$		
$(19, 3) \rightarrow (19, 4) \rightarrow (19, 5) \rightarrow$	1308	3239.30 ms
$(19, 6) \rightarrow (19, 7) \rightarrow (19, 8) \rightarrow$	1300	3237.30 IIIS
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> (19, 12) -> (19, 13) -> (19,		
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$(36, 33) \rightarrow (37, 34) \rightarrow (38, 35)$		
-> (39, 36) -> (40, 37) -> (41,		
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$(44, 41) \rightarrow (45, 42) \rightarrow (46, 43)$		
-> (47, 44) -> (48, 45) -> (49,		
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(894, 770) \rightarrow (893, 771) \rightarrow
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(890, 776) -> (890, 777) ->
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(886, 788) -> (885, 789) ->
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(896, 823) \rightarrow (897, 824) \rightarrow
(898, 825) -> (899, 826) ->
(900, 826) \rightarrow (901, 827) \rightarrow
(901, 828) \rightarrow (902, 829) \rightarrow
(903, 830) \rightarrow (903, 831) \rightarrow
(903, 832) \rightarrow (904, 833) \rightarrow
(905, 834) \rightarrow (905, 835) \rightarrow
(905, 836) \rightarrow (905, 837) \rightarrow
(905, 838) \rightarrow (906, 839) \rightarrow
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(907, 842) \rightarrow (908, 842) \rightarrow
(909, 843) \rightarrow (909, 844) \rightarrow
(910, 845) -> (911, 846) ->
(912, 847) \rightarrow (913, 848) \rightarrow
(913, 849) \rightarrow (913, 850) \rightarrow
(914, 851) \rightarrow (915, 851) \rightarrow
(916, 852) \rightarrow (916, 853) \rightarrow
(917, 854) \rightarrow (916, 855) \rightarrow
(916, 856) \rightarrow (917, 857) \rightarrow
(918, 857) -> (919, 857) ->
(920, 858) \rightarrow (919, 859) \rightarrow
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(919, 860) -> (920, 861) ->
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(922, 877) \rightarrow (923, 878) \rightarrow
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(925, 882) \rightarrow (924, 883) \rightarrow
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(933, 904) \rightarrow (933, 905) \rightarrow
(933, 906) -> (934, 907) ->
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(937, 914) \rightarrow (938, 915) \rightarrow
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(945, 929) \rightarrow (946, 929) \rightarrow
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(949, 932) \rightarrow (950, 933) \rightarrow
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(953, 935) \rightarrow (954, 936) \rightarrow
(954, 937) \rightarrow (955, 938) \rightarrow
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(953, 943) \rightarrow (952, 944) \rightarrow
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(951, 951) \rightarrow (950, 952) \rightarrow
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(952, 957) \rightarrow (951, 958) \rightarrow
(952, 959) \rightarrow (952, 960) \rightarrow
(952, 961) \rightarrow (951, 962) \rightarrow
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(952, 963) \rightarrow (952, 964) \rightarrow
(951, 965) \rightarrow (950, 966) \rightarrow
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(973, 1008) -> (974, 1009) ->
(975, 1010) -> (976, 1011) ->
(977, 1011) -> (978, 1011) ->
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(982, 1014) \rightarrow (983, 1015) \rightarrow
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(988, 1018) \rightarrow (989, 1018) \rightarrow
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(991, 1016) -> (992, 1015) ->
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(995, 1016) -> (996, 1016) ->
(997, 1016) -> (998, 1016) ->
(999, 1015) \rightarrow (1000, 1014) \rightarrow
(1001, 1013) \rightarrow (1002, 1012) -
> (1003, 1011) -> (1003, 1010)
-> (1004, 1009) -> (1005,
1008) -> (1006, 1007) ->
(1005, 1006) \rightarrow (1004, 1005) -
> (1003, 1004) -> (1003, 1003)
-> (1003, 1002) -> (1004,
1001) -> (1005, 1002)
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الگوریتمهای \*A و GBFS (جستجوی بهترین-ابتدا) هر دو برای یافتن کوتاه ترین مسیر در یک شبکه استفاده می شوند، اما تفاوتهای اساسی در نحوه عملکرد و کارایی آنها وجود دارد. الگوریتم \*A با استفاده از هزینه واقعی (g) و هزینه تخمینی تا مقصد (h) که به عنوان مجموع این دو (f) بیان می شود، بهینه ترین مسیر را پیدا می کند. این الگوریتم به دلیل استفاده از تابع هیورستیک (h) که معمولاً فاصله اقلیدسی یا منهتن است، از لحاظ تضمین یافتن کوتاه ترین مسیر کارآمدتر است و معمولاً مسیر بهینه را سریع تر و با دقت بیشتری پیدا می کند. از سوی دیگر، الگوریتم GBFS تنها از تابع هیورستیک (h) برای هدایت جستجو استفاده می کند و هزینه واقعی (g) را در نظر

نمی گیرد، به همین دلیل ممکن است مسیری پیدا کند که کوتاه ترین نباشد. این الگوریتم به دلیل سادگی و سرعت بالاتر در جستجوی اولیه، در محیطهایی که محدودیت زمانی دارند مفید است اما تضمینی برای یافتن کوتاه ترین مسیر ندارد. در مجموع، الگوریتم  $A^*$  دقیق تر و بهینه تر است و برای کاربردهای حساس مناسب تر است، در حالی که GBFS ساده تر و سریع تر است و در کاربردهایی که نیاز به جستجوی سریع دارند می تواند مناسب تر باشد، اما ممکن است مسیری غیربهینه ارائه دهد.