**Documentation**

Prim’s algorithm is used to find the minimum spanning tree for a weighted graph. My code works perfectly and all the outputs for test case matches to the ones given. I have divided my code into different functions.

The first function is called “read\_file()” which reads the long list of number from input file and finds the number of vertices to make a graph. First it makes a blank graph for number of vertices with only zeros and then using nested for-loops we add the data to the graph. We return the graph along with number of varices. The second function “prims\_algorithm()”, which is the main function, implementing prim’s algorithm. First, we print the number of vertices found. It is alwasys the first digit of the input array. We initialize all the variables to zero/false. We use a while loop to keep adding the vertices to the spanning tree until its full. We go through all the vertices and select the least expensive edge among all the adjacent selected edges. We add the selected edge to the list of selected edges and print the coordinates along with the weight.

To run the code:

* Through terminal
  + $ python src.py <input\_file>

Data structures used are list and integers.

The outputs of the deliverable files are:

**Deliverable file 1**

100 vertices found

Adding edge (0, 43) with weight 2.

Adding edge (0, 57) with weight 2.

Adding edge (43, 86) with weight 2.

Adding edge (57, 14) with weight 2.

Adding edge (14, 71) with weight 2.

Adding edge (71, 28) with weight 2.

Adding edge (28, 85) with weight 2.

Adding edge (85, 42) with weight 2.

Adding edge (42, 99) with weight 2.

Adding edge (86, 29) with weight 2.

Adding edge (29, 72) with weight 2.

Adding edge (72, 15) with weight 2.

Adding edge (15, 58) with weight 2.

Adding edge (58, 1) with weight 2.

Adding edge (1, 44) with weight 2.

Adding edge (44, 87) with weight 2.

Adding edge (87, 30) with weight 2.

Adding edge (30, 73) with weight 2.

Adding edge (73, 16) with weight 2.

Adding edge (16, 59) with weight 2.

Adding edge (59, 2) with weight 2.

Adding edge (2, 45) with weight 2.

Adding edge (45, 88) with weight 2.

Adding edge (88, 31) with weight 2.

Adding edge (31, 74) with weight 2.

Adding edge (74, 17) with weight 2.

Adding edge (17, 60) with weight 2.

Adding edge (60, 3) with weight 2.

Adding edge (3, 46) with weight 2.

Adding edge (46, 89) with weight 2.

Adding edge (89, 32) with weight 2.

Adding edge (32, 75) with weight 2.

Adding edge (75, 18) with weight 2.

Adding edge (18, 61) with weight 2.

Adding edge (61, 4) with weight 2.

Adding edge (4, 47) with weight 2.

Adding edge (47, 90) with weight 2.

Adding edge (90, 33) with weight 2.

Adding edge (33, 76) with weight 2.

Adding edge (76, 19) with weight 2.

Adding edge (19, 62) with weight 2.

Adding edge (62, 5) with weight 2.

Adding edge (5, 48) with weight 2.

Adding edge (48, 91) with weight 2.

Adding edge (91, 34) with weight 2.

Adding edge (34, 77) with weight 2.

Adding edge (77, 20) with weight 2.

Adding edge (20, 63) with weight 2.

Adding edge (63, 6) with weight 2.

Adding edge (6, 49) with weight 2.

Adding edge (49, 92) with weight 2.

Adding edge (92, 35) with weight 2.

Adding edge (35, 78) with weight 2.

Adding edge (78, 21) with weight 2.

Adding edge (21, 64) with weight 2.

Adding edge (64, 7) with weight 2.

Adding edge (7, 50) with weight 2.

Adding edge (50, 93) with weight 2.

Adding edge (93, 36) with weight 2.

Adding edge (36, 79) with weight 2.

Adding edge (79, 22) with weight 2.

Adding edge (22, 65) with weight 2.

Adding edge (65, 8) with weight 2.

Adding edge (8, 51) with weight 2.

Adding edge (51, 94) with weight 2.

Adding edge (94, 37) with weight 2.

Adding edge (37, 80) with weight 2.

Adding edge (80, 23) with weight 2.

Adding edge (23, 66) with weight 2.

Adding edge (66, 9) with weight 2.

Adding edge (9, 52) with weight 2.

Adding edge (52, 95) with weight 2.

Adding edge (95, 38) with weight 2.

Adding edge (38, 81) with weight 2.

Adding edge (81, 24) with weight 2.

Adding edge (24, 67) with weight 2.

Adding edge (67, 10) with weight 2.

Adding edge (10, 53) with weight 2.

Adding edge (53, 96) with weight 2.

Adding edge (96, 39) with weight 2.

Adding edge (39, 82) with weight 2.

Adding edge (82, 25) with weight 2.

Adding edge (25, 68) with weight 2.

Adding edge (68, 11) with weight 2.

Adding edge (11, 54) with weight 2.

Adding edge (54, 97) with weight 2.

Adding edge (97, 40) with weight 2.

Adding edge (40, 83) with weight 2.

Adding edge (83, 26) with weight 2.

Adding edge (26, 69) with weight 2.

Adding edge (69, 12) with weight 2.

Adding edge (12, 55) with weight 2.

Adding edge (55, 98) with weight 2.

Adding edge (98, 41) with weight 2.

Adding edge (41, 84) with weight 2.

Adding edge (84, 27) with weight 2.

Adding edge (27, 70) with weight 2.

Adding edge (70, 13) with weight 2.

Adding edge (13, 56) with weight 2.

Total weight of spanning tree: 198

**Deliverable file 2**

300 vertices found

Adding edge (0, 122) with weight 6.

Adding edge (122, 160) with weight 1.

Adding edge (122, 197) with weight 1.

Adding edge (122, 257) with weight 1.

Adding edge (257, 238) with weight 1.

Adding edge (238, 185) with weight 1.

Adding edge (257, 250) with weight 1.

Adding edge (250, 30) with weight 1.

Adding edge (257, 275) with weight 1.

Adding edge (275, 272) with weight 1.

Adding edge (30, 11) with weight 2.

Adding edge (30, 131) with weight 2.

Adding edge (122, 24) with weight 2.

Adding edge (122, 42) with weight 2.

Adding edge (122, 262) with weight 2.

Adding edge (160, 71) with weight 2.

Adding edge (71, 8) with weight 1.

Adding edge (8, 289) with weight 1.

Adding edge (71, 255) with weight 1.

Adding edge (289, 297) with weight 1.

Adding edge (297, 287) with weight 1.

Adding edge (287, 246) with weight 1.

Adding edge (246, 161) with weight 1.

Adding edge (246, 264) with weight 1.

Adding edge (264, 259) with weight 1.

Adding edge (8, 132) with weight 2.

Adding edge (132, 18) with weight 1.

Adding edge (18, 117) with weight 1.

Adding edge (132, 191) with weight 1.

Adding edge (191, 195) with weight 1.

Adding edge (8, 268) with weight 2.

Adding edge (268, 209) with weight 1.

Adding edge (18, 208) with weight 2.

Adding edge (208, 66) with weight 1.

Adding edge (18, 271) with weight 2.

Adding edge (71, 219) with weight 2.

Adding edge (117, 277) with weight 2.

Adding edge (277, 204) with weight 1.

Adding edge (204, 229) with weight 1.

Adding edge (229, 291) with weight 1.

Adding edge (277, 243) with weight 1.

Adding edge (243, 295) with weight 1.

Adding edge (277, 244) with weight 1.

Adding edge (244, 144) with weight 1.

Adding edge (144, 2) with weight 1.

Adding edge (144, 247) with weight 1.

Adding edge (244, 152) with weight 1.

Adding edge (291, 278) with weight 1.

Adding edge (278, 205) with weight 1.

Adding edge (205, 9) with weight 1.

Adding edge (205, 156) with weight 1.

Adding edge (156, 183) with weight 1.

Adding edge (183, 135) with weight 1.

Adding edge (135, 133) with weight 1.

Adding edge (133, 89) with weight 1.

Adding edge (135, 212) with weight 1.

Adding edge (278, 210) with weight 1.

Adding edge (210, 21) with weight 1.

Adding edge (210, 279) with weight 1.

Adding edge (291, 281) with weight 1.

Adding edge (281, 109) with weight 1.

Adding edge (281, 282) with weight 1.

Adding edge (282, 150) with weight 1.

Adding edge (282, 288) with weight 1.

Adding edge (288, 203) with weight 1.

Adding edge (291, 284) with weight 1.

Adding edge (284, 202) with weight 1.

Adding edge (202, 92) with weight 1.

Adding edge (92, 115) with weight 1.

Adding edge (2, 111) with weight 2.

Adding edge (109, 251) with weight 2.

Adding edge (133, 136) with weight 2.

Adding edge (136, 128) with weight 1.

Adding edge (136, 231) with weight 1.

Adding edge (231, 38) with weight 1.

Adding edge (136, 51) with weight 2.

Adding edge (136, 249) with weight 2.

Adding edge (152, 269) with weight 2.

Adding edge (269, 294) with weight 1.

Adding edge (294, 239) with weight 1.

Adding edge (183, 207) with weight 2.

Adding edge (207, 45) with weight 1.

Adding edge (207, 79) with weight 1.

Adding edge (207, 113) with weight 1.

Adding edge (207, 148) with weight 1.

Adding edge (148, 126) with weight 1.

Adding edge (207, 215) with weight 1.

Adding edge (79, 235) with weight 2.

Adding edge (148, 65) with weight 2.

Adding edge (65, 55) with weight 1.

Adding edge (55, 198) with weight 1.

Adding edge (148, 154) with weight 2.

Adding edge (154, 53) with weight 1.

Adding edge (53, 4) with weight 1.

Adding edge (154, 142) with weight 1.

Adding edge (53, 201) with weight 2.

Adding edge (53, 248) with weight 2.

Adding edge (142, 14) with weight 2.

Adding edge (185, 108) with weight 2.

Adding edge (108, 27) with weight 2.

Adding edge (27, 147) with weight 1.

Adding edge (27, 153) with weight 2.

Adding edge (153, 193) with weight 1.

Adding edge (108, 123) with weight 2.

Adding edge (123, 186) with weight 1.

Adding edge (193, 253) with weight 2.

Adding edge (198, 233) with weight 2.

Adding edge (201, 141) with weight 2.

Adding edge (141, 155) with weight 1.

Adding edge (155, 43) with weight 1.

Adding edge (43, 276) with weight 1.

Adding edge (276, 260) with weight 1.

Adding edge (203, 187) with weight 2.

Adding edge (204, 116) with weight 2.

Adding edge (116, 23) with weight 2.

Adding edge (23, 15) with weight 2.

Adding edge (208, 285) with weight 2.

Adding edge (285, 189) with weight 1.

Adding edge (285, 298) with weight 1.

Adding edge (298, 261) with weight 1.

Adding edge (209, 49) with weight 2.

Adding edge (49, 242) with weight 1.

Adding edge (212, 213) with weight 2.

Adding edge (213, 5) with weight 2.

Adding edge (5, 221) with weight 2.

Adding edge (221, 199) with weight 1.

Adding edge (199, 214) with weight 1.

Adding edge (213, 96) with weight 2.

Adding edge (215, 35) with weight 2.

Adding edge (221, 273) with weight 2.

Adding edge (229, 232) with weight 2.

Adding edge (232, 254) with weight 1.

Adding edge (254, 224) with weight 1.

Adding edge (229, 241) with weight 2.

Adding edge (233, 283) with weight 2.

Adding edge (283, 286) with weight 1.

Adding edge (286, 90) with weight 1.

Adding edge (239, 258) with weight 2.

Adding edge (241, 107) with weight 2.

Adding edge (243, 234) with weight 2.

Adding edge (234, 119) with weight 1.

Adding edge (119, 72) with weight 2.

Adding edge (244, 263) with weight 2.

Adding edge (247, 29) with weight 2.

Adding edge (249, 121) with weight 2.

Adding edge (251, 267) with weight 2.

Adding edge (253, 166) with weight 2.

Adding edge (166, 293) with weight 2.

Adding edge (254, 237) with weight 2.

Adding edge (237, 174) with weight 1.

Adding edge (174, 114) with weight 1.

Adding edge (174, 206) with weight 1.

Adding edge (237, 227) with weight 1.

Adding edge (227, 171) with weight 1.

Adding edge (171, 91) with weight 1.

Adding edge (227, 228) with weight 2.

Adding edge (228, 225) with weight 2.

Adding edge (225, 62) with weight 1.

Adding edge (62, 80) with weight 1.

Adding edge (225, 69) with weight 1.

Adding edge (69, 138) with weight 2.

Adding edge (80, 265) with weight 2.

Adding edge (225, 211) with weight 2.

Adding edge (211, 118) with weight 1.

Adding edge (211, 67) with weight 2.

Adding edge (67, 33) with weight 2.

Adding edge (262, 120) with weight 2.

Adding edge (120, 61) with weight 2.

Adding edge (264, 85) with weight 2.

Adding edge (277, 290) with weight 2.

Adding edge (278, 222) with weight 2.

Adding edge (282, 240) with weight 2.

Adding edge (283, 256) with weight 2.

Adding edge (294, 252) with weight 2.

Adding edge (294, 292) with weight 2.

Adding edge (292, 179) with weight 2.

Adding edge (179, 172) with weight 2.

Adding edge (297, 296) with weight 2.

Adding edge (297, 299) with weight 2.

Adding edge (299, 64) with weight 2.

Adding edge (2, 81) with weight 3.

Adding edge (11, 223) with weight 3.

Adding edge (223, 26) with weight 1.

Adding edge (223, 25) with weight 2.

Adding edge (14, 47) with weight 3.

Adding edge (47, 58) with weight 1.

Adding edge (58, 73) with weight 2.

Adding edge (26, 145) with weight 3.

Adding edge (66, 102) with weight 3.

Adding edge (102, 151) with weight 2.

Adding edge (72, 194) with weight 3.

Adding edge (194, 236) with weight 1.

Adding edge (194, 139) with weight 2.

Adding edge (139, 88) with weight 1.

Adding edge (236, 192) with weight 2.

Adding edge (91, 84) with weight 3.

Adding edge (84, 124) with weight 1.

Adding edge (124, 3) with weight 1.

Adding edge (3, 93) with weight 1.

Adding edge (84, 83) with weight 3.

Adding edge (84, 87) with weight 3.

Adding edge (109, 181) with weight 3.

Adding edge (181, 40) with weight 1.

Adding edge (40, 104) with weight 1.

Adding edge (116, 188) with weight 3.

Adding edge (122, 46) with weight 3.

Adding edge (123, 74) with weight 3.

Adding edge (126, 98) with weight 3.

Adding edge (131, 10) with weight 3.

Adding edge (131, 37) with weight 3.

Adding edge (37, 82) with weight 1.

Adding edge (141, 157) with weight 3.

Adding edge (153, 32) with weight 3.

Adding edge (32, 75) with weight 3.

Adding edge (155, 164) with weight 3.

Adding edge (164, 162) with weight 1.

Adding edge (179, 169) with weight 3.

Adding edge (187, 190) with weight 3.

Adding edge (208, 140) with weight 3.

Adding edge (209, 95) with weight 3.

Adding edge (213, 63) with weight 3.

Adding edge (214, 44) with weight 3.

Adding edge (219, 200) with weight 3.

Adding edge (200, 129) with weight 2.

Adding edge (129, 112) with weight 1.

Adding edge (200, 175) with weight 3.

Adding edge (224, 146) with weight 3.

Adding edge (227, 97) with weight 3.

Adding edge (247, 137) with weight 3.

Adding edge (137, 280) with weight 2.

Adding edge (280, 177) with weight 1.

Adding edge (248, 226) with weight 3.

Adding edge (249, 176) with weight 3.

Adding edge (257, 170) with weight 3.

Adding edge (258, 245) with weight 3.

Adding edge (245, 196) with weight 3.

Adding edge (196, 16) with weight 2.

Adding edge (16, 125) with weight 2.

Adding edge (259, 7) with weight 3.

Adding edge (267, 50) with weight 3.

Adding edge (267, 274) with weight 3.

Adding edge (268, 130) with weight 3.

Adding edge (130, 6) with weight 3.

Adding edge (6, 163) with weight 1.

Adding edge (277, 220) with weight 3.

Adding edge (289, 266) with weight 3.

Adding edge (266, 22) with weight 1.

Adding edge (22, 270) with weight 1.

Adding edge (293, 101) with weight 3.

Adding edge (5, 76) with weight 4.

Adding edge (7, 1) with weight 4.

Adding edge (35, 41) with weight 4.

Adding edge (55, 60) with weight 4.

Adding edge (74, 19) with weight 4.

Adding edge (111, 184) with weight 4.

Adding edge (145, 94) with weight 4.

Adding edge (146, 178) with weight 4.

Adding edge (147, 165) with weight 4.

Adding edge (156, 78) with weight 4.

Adding edge (156, 230) with weight 4.

Adding edge (162, 168) with weight 4.

Adding edge (185, 180) with weight 4.

Adding edge (234, 217) with weight 4.

Adding edge (247, 143) with weight 4.

Adding edge (250, 99) with weight 4.

Adding edge (253, 77) with weight 4.

Adding edge (255, 167) with weight 4.

Adding edge (167, 57) with weight 1.

Adding edge (291, 39) with weight 4.

Adding edge (7, 110) with weight 5.

Adding edge (110, 158) with weight 1.

Adding edge (37, 134) with weight 5.

Adding edge (40, 52) with weight 5.

Adding edge (52, 34) with weight 1.

Adding edge (138, 31) with weight 5.

Adding edge (31, 86) with weight 3.

Adding edge (138, 103) with weight 5.

Adding edge (206, 68) with weight 5.

Adding edge (68, 106) with weight 2.

Adding edge (236, 218) with weight 5.

Adding edge (257, 216) with weight 5.

Adding edge (278, 105) with weight 5.

Adding edge (283, 54) with weight 5.

Adding edge (290, 59) with weight 5.

Adding edge (2, 100) with weight 6.

Adding edge (34, 159) with weight 6.

Adding edge (42, 36) with weight 6.

Adding edge (43, 149) with weight 6.

Adding edge (133, 182) with weight 6.

Adding edge (201, 173) with weight 6.

Adding edge (250, 48) with weight 6.

Adding edge (288, 20) with weight 6.

Adding edge (293, 70) with weight 6.

Adding edge (85, 13) with weight 7.

Adding edge (248, 127) with weight 7.

Adding edge (107, 56) with weight 8.

Adding edge (274, 12) with weight 8.

Adding edge (24, 28) with weight 12.

Adding edge (123, 17) with weight 12.

Total weight of spanning tree: 677