

### Question 1

- a. We have implemented the required function **neuman\_girvan(network, k)** in the file **question1.py**.
- b. The result of running the algorithm on the provided dataset:

**The loaded grap:**

Loaded graph with 333 nodes

Target component size: 324

**The resulting components from the algorithm:**

Component 1 of size:223

{1, 3, 5, 7, 9, 10, 13, 16, 21, 22, 24, 25, 26, 27, 29, 30, 31, 34, 36, 38, 39, 40, 45, 47, 48, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 62, 63, 64, 65, 66, 67, 69, 72, 73, 75, 76, 77, 79, 80, 81, 82, 83, 84, 85, 87, 88, 92, 94, 96, 98, 100, 101, 103, 104, 105, 106, 107, 108, 109, 113, 117, 118, 119, 120, 121, 122, 123, 125, 126, 127, 128, 129, 130, 132, 133, 134, 135, 136, 139, 141, 142, 146, 148, 150, 153, 156, 158, 159, 160, 161, 163, 164, 165, 166, 168, 169, 170, 171, 172, 173, 176, 178, 180, 183, 184, 185, 186, 187, 188, 189, 190, 191, 194, 196, 197, 198, 199, 200, 202, 203, 204, 206, 207, 208, 211, 212, 213, 217, 221, 222, 223, 224, 228, 229, 231, 232, 234, 235, 236, 237, 238, 239, 242, 246, 247, 248, 249, 250, 251, 252, 254, 257, 258, 260, 261, 265, 266, 268, 269, 270, 271, 272, 274, 276, 277, 280, 281, 283, 284, 285, 286, 288, 290, 291, 294, 295, 297, 298, 299, 300, 301, 302, 303, 304, 308, 309, 311, 313, 314, 315, 316, 317, 318, 320, 322, 323, 324, 325, 329, 330, 331, 332, 334, 336, 338, 339, 340, 341, 342, 344, 345, 346, 347}

Component 2 of size:91

{2, 6, 8, 14, 17, 19, 20, 23, 28, 32, 35, 41, 44, 46, 49, 52, 61, 68, 70, 71, 86, 89, 91, 93, 95, 97, 99, 102, 110, 111, 112, 115, 116, 124, 131, 137, 138, 140, 143, 144, 147, 149, 151, 154, 155, 157, 162, 167, 174, 175, 177, 182, 192, 193, 201, 205, 214, 216, 219, 220, 225, 226, 227, 230, 240, 241, 243, 245, 253, 255, 259, 262, 263, 264, 267, 278, 279, 289, 293, 296, 305, 307, 310, 312, 319, 321, 326, 327, 333, 337, 343}

Component 3 of size:10

{195, 4, 328, 78, 273, 306, 275, 181, 152, 218}