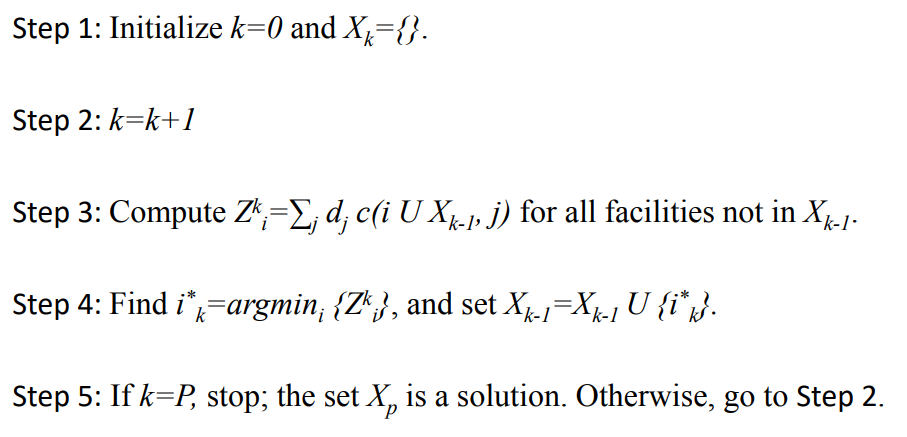
1. (a)



(b)

* p = 4; k = 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** |
| A | 0 | 225 | 555 | 825 | 360 | 900 | 270 | 495 | 720 | 600 | 870 | 1005 |
| B | 150 | 0 | 220 | 400 | 380 | 520 | 330 | 480 | 420 | 550 | 610 | 610 |
| C | 444 | 264 | 0 | 216 | 192 | 360 | 492 | 336 | 240 | 696 | 468 | 468 |
| D | 990 | 720 | 324 | 0 | 612 | 216 | 1062 | 828 | 432 | 1116 | 774 | 612 |
| E | 120 | 190 | 80 | 170 | 0 | 180 | 125 | 60 | 120 | 235 | 185 | 215 |
| F | 1440 | 1248 | 720 | 288 | 864 | 0 | 1368 | 1008 | 288 | 1200 | 744 | 528 |
| G | 198 | 363 | 451 | 649 | 275 | 627 | 0 | 165 | 495 | 242 | 440 | 671 |
| H | 528 | 768 | 448 | 736 | 192 | 672 | 240 | 0 | 480 | 592 | 400 | 736 |
| I | 624 | 546 | 260 | 312 | 312 | 156 | 585 | 390 | 0 | 494 | 247 | 247 |
| J | 880 | 1210 | 1276 | 1364 | 1034 | 1100 | 484 | 814 | 836 | 0 | 418 | 880 |
| K | 1102 | 1159 | 741 | 817 | 703 | 589 | 760 | 475 | 361 | 361 | 0 | 399 |
| L | 1340 | 1220 | 780 | 680 | 860 | 440 | 1220 | 920 | 380 | 800 | 420 | 0 |
|  | **7816** | **7913** | **5855** | **6457** | **5784** | **5760** | **6936** | **5971** | **4772** | **6886** | **5576** | **6371** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** |
| A | 0 | 225 | 555 | 720 | 360 | 720 | 270 | 495 | 720 | 600 | 720 | 720 |
| B | 150 | 0 | 220 | 400 | 380 | 420 | 330 | 420 | 420 | 420 | 420 | 420 |
| C | 240 | 240 | 0 | 216 | 192 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| D | 432 | 432 | 324 | 0 | 432 | 216 | 432 | 432 | 432 | 432 | 432 | 432 |
| E | 120 | 120 | 80 | 120 | 0 | 120 | 120 | 60 | 120 | 120 | 120 | 120 |
| F | 288 | 288 | 288 | 288 | 288 | 0 | 288 | 288 | 288 | 288 | 288 | 288 |
| G | 198 | 363 | 451 | 495 | 275 | 495 | 0 | 165 | 495 | 242 | 440 | 495 |
| H | 480 | 480 | 448 | 480 | 192 | 480 | 240 | 0 | 480 | 480 | 400 | 480 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| J | 836 | 836 | 836 | 836 | 836 | 836 | 484 | 814 | 836 | 0 | 418 | 836 |
| K | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 0 | 361 |
| L | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 0 |
|  | **3485** | **3725** | **3943** | **4296** | **3696** | **4268** | **3145** | **3655** | **4772** | **3563** | **3858** | **4392** |

* p=4; k=2
* = 4; k = 2
* p=4; k=3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** |
| A | 0 | 225 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| B | 150 | 0 | 220 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 |
| C | 240 | 240 | 0 | 216 | 192 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| D | 432 | 432 | 324 | 0 | 432 | 216 | 432 | 432 | 432 | 432 | 432 | 432 |
| E | 120 | 120 | 80 | 120 | 0 | 120 | 120 | 60 | 120 | 120 | 120 | 120 |
| F | 288 | 288 | 288 | 288 | 288 | 0 | 288 | 288 | 288 | 288 | 288 | 288 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H | 240 | 240 | 240 | 240 | 192 | 240 | 240 | 0 | 240 | 240 | 240 | 240 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| J | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 0 | 418 | 484 |
| K | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 0 | 361 |
| L | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 0 |
|  | **2695** | **2770** | **2647** | **2689** | **2929** | **2641** | **3145** | **2845** | **3145** | **2661** | **2718** | **2765** |

* p=4; k=4

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** |
| A | 0 | 225 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| B | 150 | 0 | 220 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 |
| C | 240 | 240 | 0 | 216 | 192 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| D | 216 | 216 | 216 | 0 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| E | 120 | 120 | 80 | 120 | 0 | 120 | 120 | 60 | 120 | 120 | 120 | 120 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H | 240 | 240 | 240 | 240 | 192 | 240 | 240 | 0 | 240 | 240 | 240 | 240 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| J | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 484 | 0 | 418 | 484 |
| K | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 0 | 361 |
| L | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 0 |
|  | **2191** | **2266** | **2251** | **2401** | **2425** | **2641** | **2641** | **2341** | **2641** | **2157** | **2214** | **2261** |

* When it gets p=k, then go to the final step, the last context of node list is like the following

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** | **E** | **F** | **G** | **H** | **I** | **J** | **K** | **L** |
| A | 0 | 225 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| B | 150 | 0 | 220 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 |
| C | 240 | 240 | 0 | 216 | 192 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| D | 216 | 216 | 216 | 0 | 216 | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| E | 120 | 120 | 80 | 120 | 0 | 120 | 120 | 60 | 120 | 120 | 120 | 120 |
| F | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| G | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| H | 240 | 240 | 240 | 240 | 192 | 240 | 240 | 0 | 240 | 240 | 240 | 240 |
| I | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| J | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| K | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 361 | 0 | 361 |
| L | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 380 | 0 |
|  | **1707** | **1782** | **1767** | **1917** | **1941** | **2157** | **2157** | **1857** | **2157** | **2157** | **1796** | **1777** |

(c) **Summary Of Exchange Values for F node**: There is no improvement as no negative value has been located in change column

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Remove | Replace With | Old Value | New Value | Change |
| F | A | 2157 | 2211 | 54 |
| F | B | 2157 | 2286 | 129 |
| F | C | 2157 | 2163 | 6 |
| F | D | 2157 | 2205 | 48 |
| F | E | 2157 | 2445 | 288 |
| F | H | 2157 | 2361 | 204 |
| F | K | 2157 | 2281 | 124 |

**Summary Of Exchange Values for G node**: There is an improvement with the change using A node instead of G.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Remove | Replace With | Old Value | New Value | Change |
| G | A | 2157 | 2145 | -12 |
| G | B | 2157 | 2264 | 107 |
| G | C | 2157 | 2502 | 345 |
| G | D | 2157 | 2799 | 642 |
| G | E | 2157 | 2323 | 166 |
| G | H | 2157 | 2337 | 180 |
| G | K | 2157 | 2618 | 461 |
| G | K | 2157 | 2618 | 461 |
| G | L | 2157 | 2679 | 522 |

**Summary Of Exchange Values for I node**: Negative values in the following table indicates an improment. According the algorithm we should choose the negative value which has the maximum absolute value.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Remove | Replace With | Old Value | New Value | Change |
| I | A | 2157 | 2043 | -114 |
| I | B | 2157 | 2027 | -130 |
| I | C | 2157 | 1983 | -174 |
| I | D | 2157 | 2138 | -19 |
| I | E | 2157 | 2157 | 0 |
| I | H | 2157 | 2169 | 12 |
| I | K | 2157 | 2117 | -40 |
| I | L | 2157 | 2058 | -99 |

**Summary Of Exchange Values for J node**: There is no improvement in the following table as it can be seen in the following table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Remove | Replace With | Old Value | New Value | Change |
| J | A | 2157 | 2191 | 34 |
| J | B | 2157 | 2266 | 109 |
| J | C | 2157 | 2251 | 94 |
| J | D | 2157 | 2401 | 244 |
| J | E | 2157 | 2425 | 268 |
| J | H | 2157 | 2341 | 184 |
| J | K | 2157 | 2214 | 57 |
| J | L | 2157 | 2261 | 104 |

So the result after the first phase of the algorithm finalizes, the overall change list is like the table on the following.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| G | A | 2157 | 2145 | -12 |
| I | C | 2157 | 1983 | -174 |