CPS740 - Lista 4

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Questão 1.:

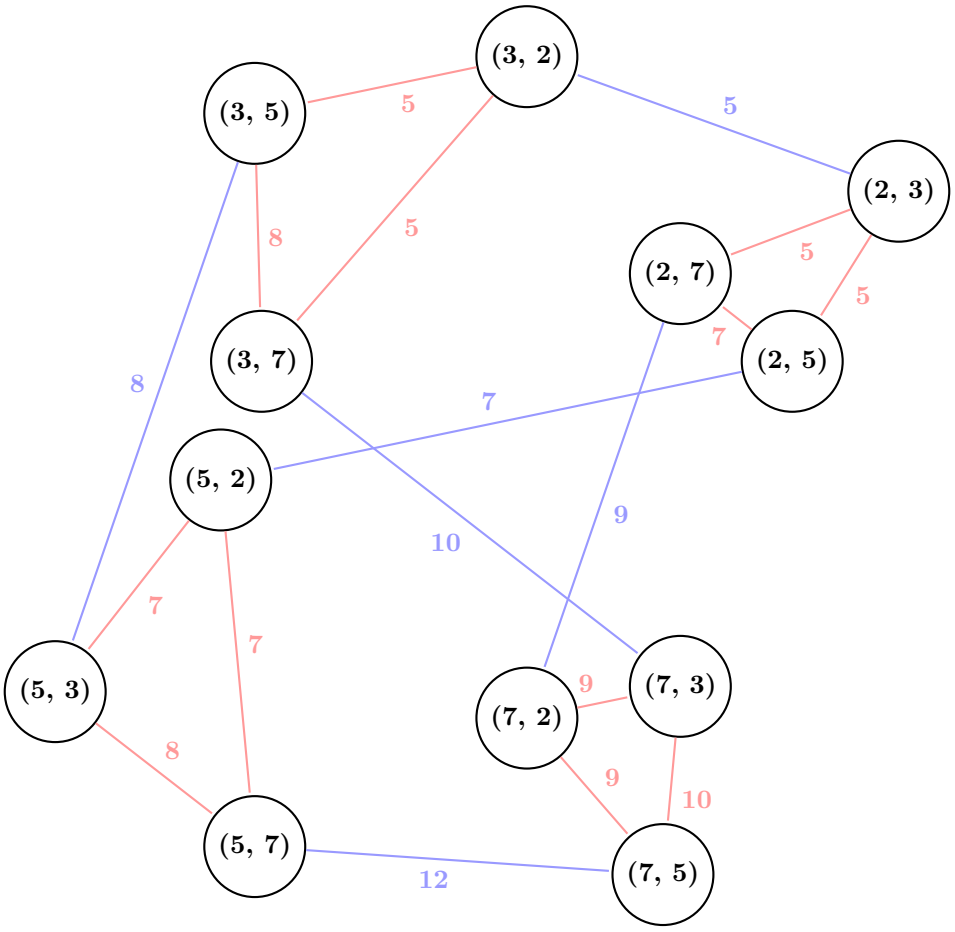
Seguindo as especificações do grafo obtemos:

$$V = \{(2,3),(2,5),(2,7),(3,2),(3,5),(3,7),\\ (5,2),(5,3),(5,7),(7,2),(7,3),(7,5)\}$$

$$E_1 = \{((2,3),(3,2)),((2,5),(5,2)),((2,7),(7,2)),\\ ((3,5),(5,3)),((3,7),(7,3)),((5,7),(7,5))\}$$

$$E_2 = \{((2,3),(2,5)),\ ((2,3),(2,7)),\ ((2,5),(2,7)),\\ ((3,2),(3,5)),\ ((3,2),(3,7)),\ ((3,5),(3,7)),\\ ((5,2),(5,3)),\ ((5,2),(5,7)),\ ((5,3),(5,7)),\\ ((7,2),(7,3)),\ ((7,2),(7,5)),\ ((7,3),(7,5))\}$$

a) Desenhamos $G(V, E_1 \cup E_2)$ com os respectivos pesos indicados em cada uma das arestas. As arestas pertencentes a E_1 foram coloridas de azul, enquanto as de E_2 estão vestidas de vermelho.



b)
```
Mathematics Error: `Vertex (1, 2)` not found.
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```

Questão 2.:

Algoritmo 1.: Floyd-Warshall++

```
def floyd_warshall(G(V, E), P[n][n]):
    // G(V, E) um grafo
    // P[n][n] a matriz de pesos das arestas de G
    seja n ← |V|

    seja dist[n][n] ← ∞
    seja kmin[n][n] ← nulo

    para cada [u, v] em E:
        dist[u][v] ← P[u][v]
        kmin[u][v] ← v

    para cada v em V:
        dist[v][v] ← 0
        kmin[v][v] ← v

    para k de 1 até n:
        para i de 1 até n:
            para j de 1 até n:
                se dist[k][k] < 0:
                    // Achamos um ciclo negativo
                    retorna nulo
                se dist[i][j] > dist[i][k] + dist[k][j]:
                    // Preferimos ir de `i` para `k`
                    // do que de `i` para `j`
                    dist[i][j] ← dist[i][k] + dist[k][j]
                    kmin[i][j] ← kmin[i][k]

    seja caminhos[n][n]

    para cada [u, v] em V × V:
        se kmin[u][v] = nulo:
            caminhos[u][v] ← nulo
        senão:
            caminhos[u][v] ← lista([u])
            enquanto u != v:
                u ← kmin[u][v]
                caminhos[u][v].inserir(u)

    retorna caminhos
```

Questão 3.:

i)

ii)

Questão 4.:

Questão 5.:

Referências

[1] Jayme Luiz Szwarcfiter, **Teoria Computacional de Grafos**, 1ª edição, Rio de Janeiro, 2018.