SWERC NoteBook

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1 Parcours de graphes

1.1 Implémentation des graphes

1.1.1 C/C++

1.1.2 Python

1.2 DFS - Depth First Search

1.3 BFS - Breadth First Search

1.4 Topological Sort

1.5 Composantes connexes

1.6 Composantes bi-connexe

1.7 Composantes fortement connexe

1.8 2-SAT

1.9 Postier Chinois

1.10 Chemin eulérien

1.11 Chemin le plus court

1.11.1 Poids positif ou nul - Dijkstra

1.11.2 Poids arbitraire - Bellman-Ford

1.11.3 Floyd-Warshall

2 Points et polygones

2.1 Points

2.1.1 Points

```
class Point:
    def __init__(self, x, y):
        self.x = x
        self.y = y
    def subtract(self, p):
      return Point(self.x - p.x, self.y - p.y)
    def __str__(self):
        return ’(’ + str(self.x) + ’, ’ + str(self.y) + ’)’
```

2.1.2 Cross-product

```
def cross_product(p1, p2):
  return p1.x * p2.y - p2.x * p1.y
```

2.1.3 Direction

```python
def direction(p1, p2, p3):
  return cross_product(p3.subtract(p1), p2.subtract(p1))
# checks if p3 makes left turn at p2
def left(p1, p2, p3):
  return direction(p1, p2, p3) < 0
# checks if p3 makes right turn at p2
def right(p1, p2, p3):
  return direction(p1, p2, p3) > 0
# checks if p1, p2 and p3 are collinear
def collinear(p1, p2, p3):
  return direction(p1, p2, p3) == 0
```

2.2 Enveloppe convexe

2.2.1 Marche de Jarvis

```python
def jarvis_march(points):
    a = min(points, key = lambda point: point.x)
    index = points.index(a)
    l = index
    result = []
    result.append(a)
    while (True):
        q = (l + 1) % len(points)
        for i in range(len(points)):
            if i == l:
                continue
            d = direction(points[l], points[i], points[q])
            if d > 0 or (d == 0 and distance_sq(points[i], points[l]) > distance_sq(points[q], points[l
                ])):
                q = i
        l = q
        if l == index:
            break
        result.append(points[q])
    return result
```

2.2.2 Graham Scan

2.3 Aire d'un polygone

2.4 Paire de points les plus proches

3 Ensembles

3.1 Rendu de monnaie

3.2 Sac à dos

3.3 k-somme

4 Calculs

4.1 PGCD

```python
def pgcd(a,b):
    return a if b == 0 else pgcd(b,a%b)
```

4.2 Coefficients de Bézout

```python
def bezout(a,b):
    if b == 0:
        return (1,0)
    else:
        u,v = bezout(b,a%b)
        return (v, u - (a//b) *v)
def inv(a,p):
    return bezout(a,p)[0]%p
```

4.3 Coefficients binomiaux

```python
def binom(n,k,p):
    prod = 1
    for i in range(k):
        prod = (prod * (n-i)) // (i+1) %p
    return prod
#Enlever le p et mod p pour sans modulo
```