# Visualisation of graphs

## Planarity with y-Files

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Fall semester 2020

# Introduction

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- **Dart**
  - models an edge as part of a face
- **PlanarEmbedding**
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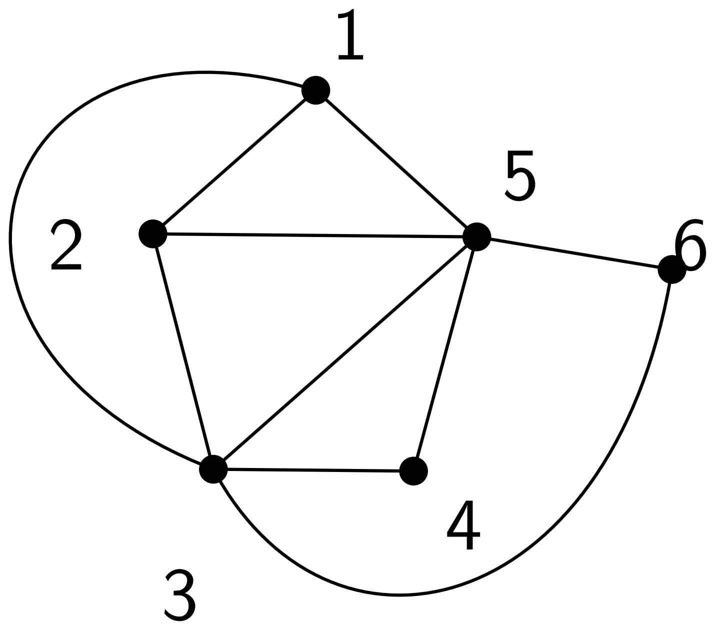

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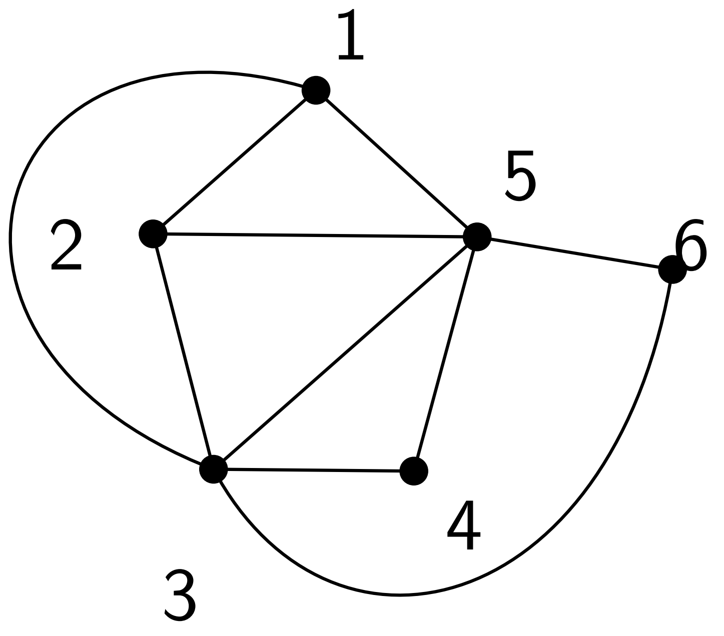
- each edge is associated to two darts
- each face is a list of darts
  – *in clockwise order along the boundary of the face*
- the cyclic order of the darts around a vertex is part of the embedding



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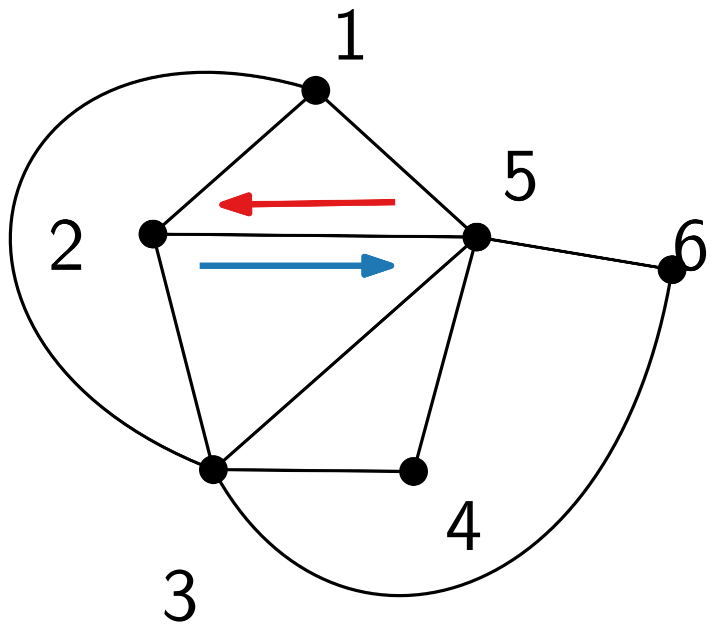

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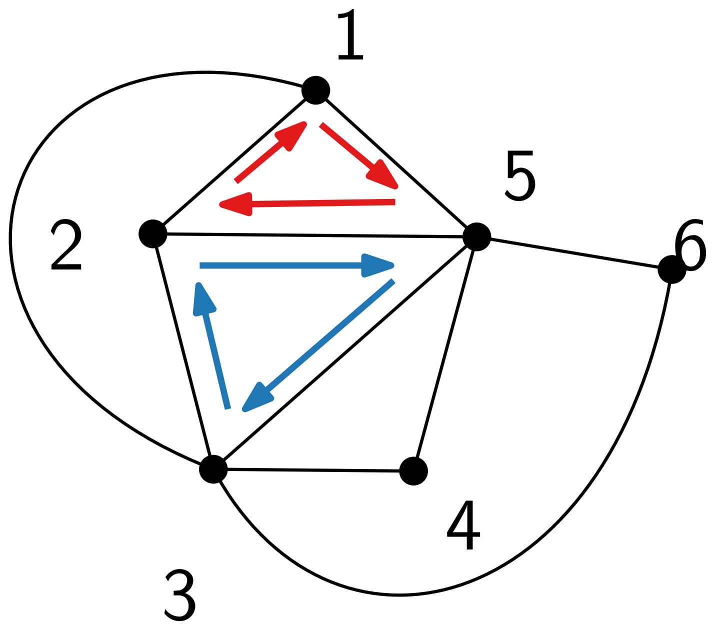

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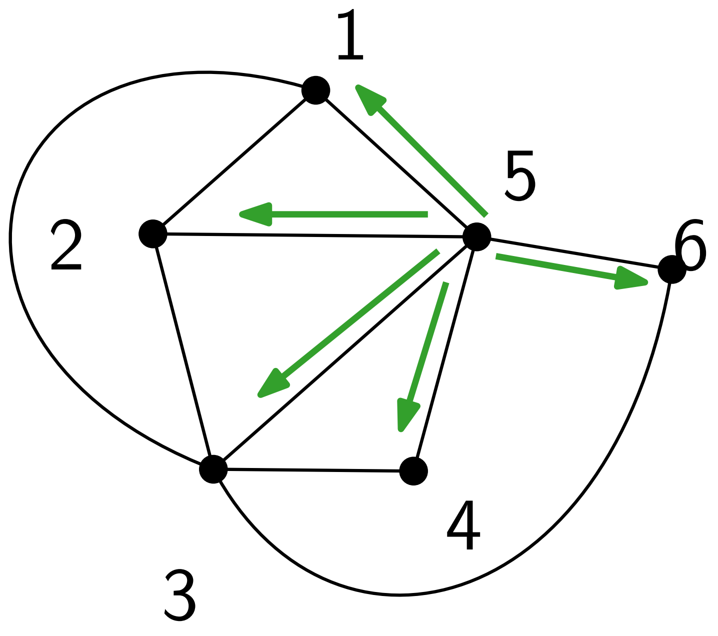

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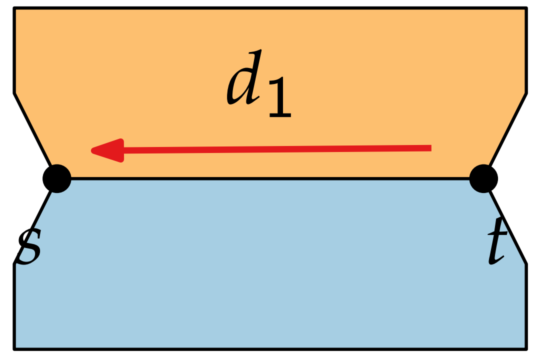
**Methods:**

- Dart getOppositeDart( )
- Edge getAssociatedEdge( )
- boolean isReversed( )
- List <Dart> getFace( )



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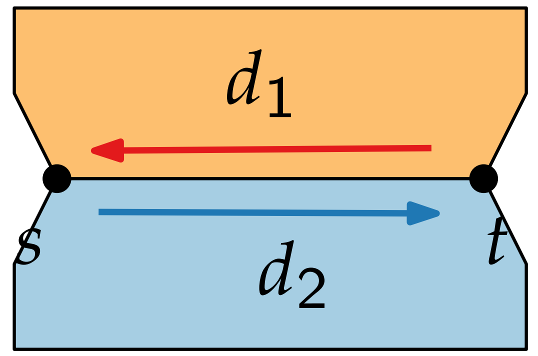

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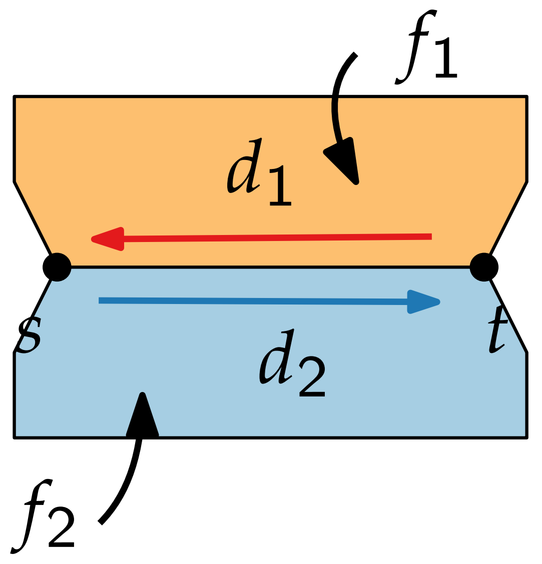

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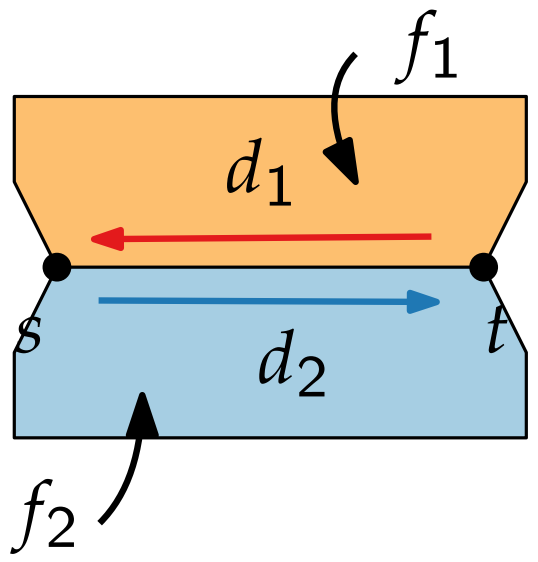

**Example:**

```
{
    Dart d1 = ...;
    List<Dart> f1 = d1.getFace( );
    Dart d2 = d1.getOppositeDart( );
    List<Dart> f2 = d2.getFace( );
}
```

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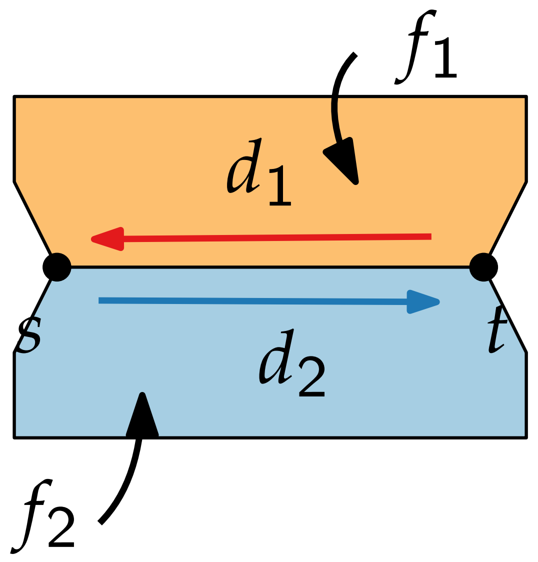

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Classes Dart and PlanarEmbedding are associated with instances of Graph (or GraphLayout), not IGraph!!

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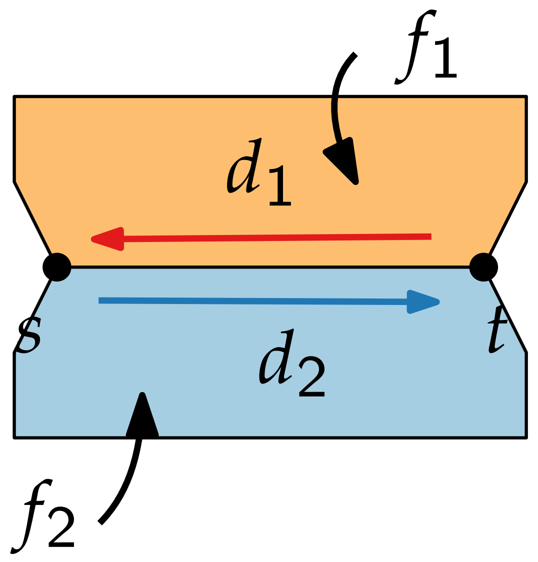

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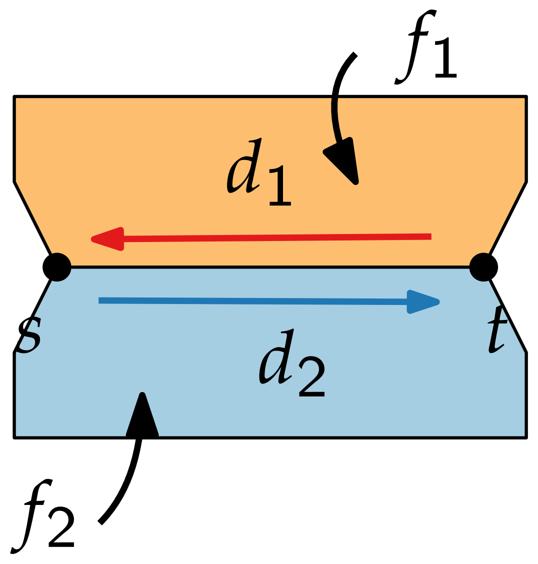
```
{
    Dart d1 = ...;
    Dart d2 = d1.getOppositeDart( );
    Edge e1 = d1.getAssociatedEdge( );
    Edge e2 = d2.getAssociatedEdge( );
     //e1==e2
}
```



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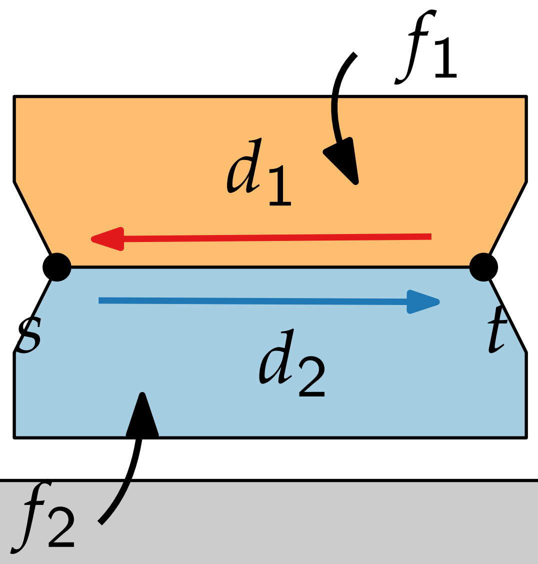

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     //e1==e2
}
```

**Example:**

```
{
    Dart d1 = ...;
    Edge e1 = d1.getAssociatedEdge( );
    Node s1 = null;
    if (!d1.isReversed( ))
        s1 = e1.source( );
    else
        s1 = e1.target( );
}
```

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- PlanarEmbedding(Graph)

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- Dart getCyclicNext(Dart)
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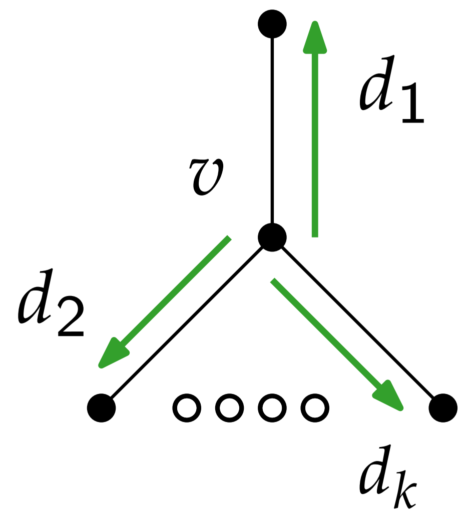
- List<Dart> getOutgoindDarts(Node)

darts around a vertex in counter-clockwise order



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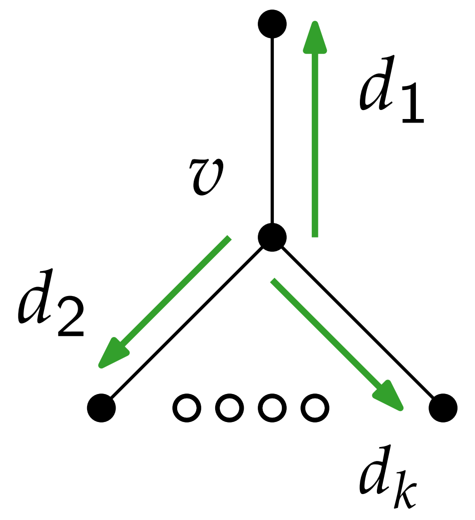
- (static) boolean isPlanar(Graph)



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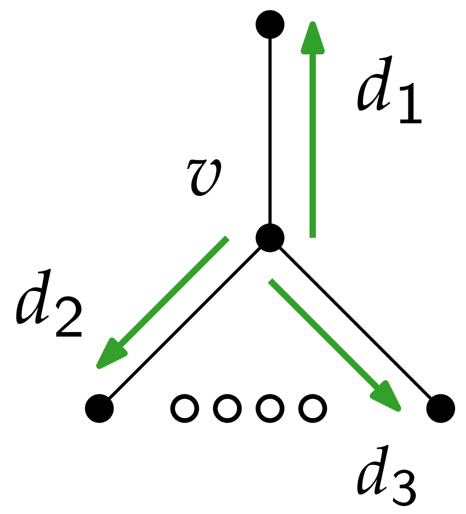

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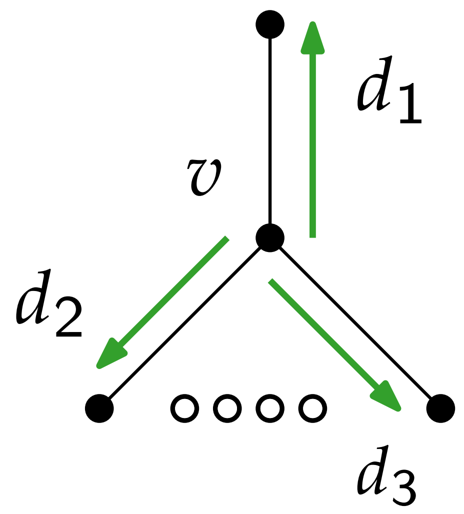

**Example:**

```
{
    Graph g = ...;
    PlanarEbedding emb =
        new PlanarEmbedding(g);
    Dart d1 = ...;
    Dart d = emb.getCyclicNext(d1);
    while (d != d1) {
        //do some process
        d = emb.getCyclicNext(d);
    }
}
```