Project 4 by Tianhua Zhao

Gitlab: <https://gitlab.com/tzhaojustdoit/student1819009>

Motion primitives:

* Developed offline in c++
  + - Probably harder to do in c++ than in matlab or excel. I am not familiar with exporting to .txt file in matlab or excel.
* Bezier curve:
  + Quintic bezier curve: (0, 0) (20, 0) (40, 0) (60, 3.7) (80, 3.7) (100, 3.7)
    - By observation, these control points result in a smooth curve
* 3 motion primitives:
  + Straight: displacement (5, 0) cost 5
  + Left turn: displacement ( 100, 3.7) cost 150
  + Right turn: displacement (100, -3.7) cost 150

Graph configuration:

* Discretization : 5m \* 3.7m \* 0.2s; 400 \* 3 \* 400 = 480000 nodes
  + - Grid width is same as lane width. One grid column per lane makes the problem simple. Having multiple grid columns per lane would allow the vehicle to deviate from the center line, but it is not so necessary for this project.
* First grid’s center is at (0,0) in map frame

Graph search algorithm:

* Weighted A\* with epsilon = 1.1
  + - Not an incremental search since map is not changing.
    - Better planning time than A\*

Collision checking:

* Inner outer circle check, then bounding box check.