Project 2: Vector-Valued Functions

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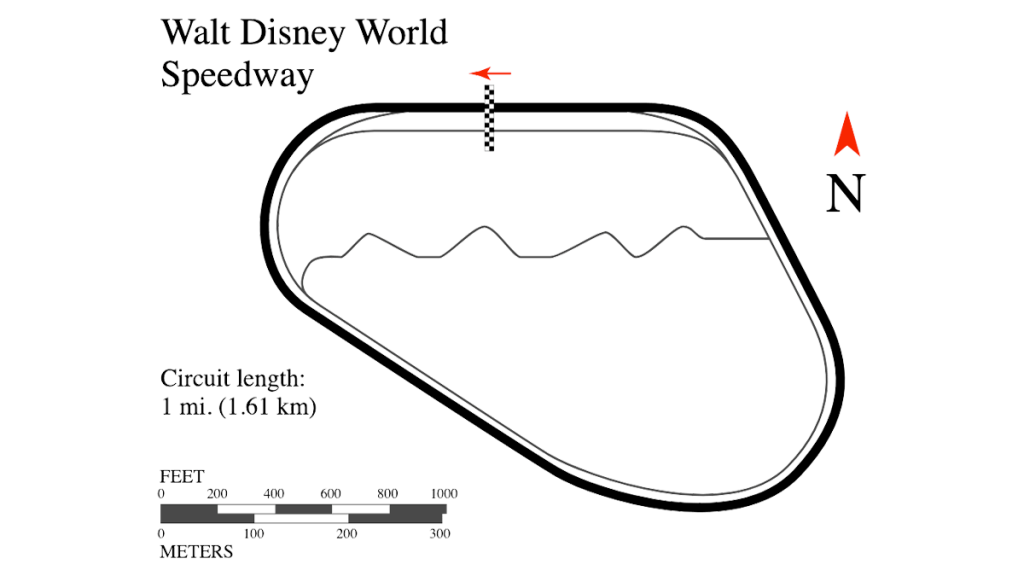
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# Part 1 - A Brief History of Auto-Racing

Auto-Racing.

# Part 2 - Navigating Flat Turns

The *Walt Disney World Speedway* in Orlando, Florida has 3 *straightaways* and 3 *turns*. The straightaways have lengths of , , and . The turns have lengths of , , and .



#### I. Velocity and Acceleration Vectors

Let be the *position vector* of Babić’s race car at *Turn 1*:

Differentiating with respect to , we can get the *velocity vector* :

Differentiating with respect to again, we can get the *acceleration vector* :

To find *speed* , we can simply take the magnitude of the velocity vector:

We can also graph , , and on the same plane: ![](data:video/mp4;base64,) Now let be the *position vector* of Babić’s race car at *Turn 2*:

We can repeat the same processes we used for Turn 1 to find , , and :

Lastly, let’s set be the *position vector* of Babić’s race car at *Turn 3*:

Again, using the same processes to find , , and :

#### II. Taking Turns

#### III. Graphing Velocity and Acceleration Vectors

#### IV. Staying on Track

# Part 3 - Driving Banked Turns

No.

# Bibliography