

Programming Assignment #2

Jeremy Giles

System of Linear Equations

<p>Intersection A</p> <p>Traffic in = X_1</p> <p>Traffic out = $X_2 + 100$</p> <p>Traffic in = traffic out</p> <p>$X_1 = X_2 + 100$</p> <p>$X_1 - X_2 = 100$</p>	<p>Intersection D</p> <p>Traffic in = $X_4 + 150$</p> <p>Traffic out = X_5</p> <p>Traffic in = traffic out</p> <p>$X_4 + 150 = X_5$</p> <p>$X_5 - X_4 = 150$</p>	<p>System</p> <p>$X_1 - X_2 = 100$</p> <p>$X_3 - X_2 = 50$</p> <p>$X_3 - X_4 = 120$</p> <p>$X_5 - X_4 = 150$</p> <p>$X_5 - X_6 = 80$</p> <p>$X_1 - X_6 = 100$</p>																																										
<p>Intersection B</p> <p>Traffic in = $X_2 + 50$</p> <p>Traffic out = X_3</p> <p>Traffic in = traffic out</p> <p>$X_2 + 50 = X_3$</p> <p>$50 = X_3 - X_2$</p> <p>$X_3 - X_2 = 50$</p>	<p>Intersection E</p> <p>Traffic in = X_5</p> <p>Traffic out = $X_6 + 80$</p> <p>Traffic in = traffic out</p> <p>$X_5 = X_6 + 80$</p> <p>$X_5 - X_6 = 80$</p>	<p>Matrix</p> <table><tr><td>1</td><td>-1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>100</td></tr><tr><td>0</td><td>-1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>50</td></tr><tr><td>0</td><td>0</td><td>1</td><td>-1</td><td>0</td><td>0</td><td>120</td></tr><tr><td>0</td><td>0</td><td>0</td><td>-1</td><td>1</td><td>0</td><td>150</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>-1</td><td>80</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>-1</td><td>100</td></tr></table>	1	-1	0	0	0	0	100	0	-1	1	0	0	0	50	0	0	1	-1	0	0	120	0	0	0	-1	1	0	150	0	0	0	0	1	-1	80	1	0	0	0	0	-1	100
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<p>Intersection C</p> <p>Traffic in = X_3</p> <p>Traffic out = $X_4 + 120$</p> <p>Traffic in = traffic out</p> <p>$X_3 = X_4 + 120$</p> <p>$X_3 - X_4 = 120$</p>	<p>Intersection F</p> <p>Traffic in = $X_6 + 100$</p> <p>Traffic out = X_1</p> <p>Traffic in = traffic out</p> <p>$X_6 + 100 = X_1$</p> <p>$X_1 - X_6 = 100$</p>																																											

Pseudocode

Import numpy

Print linear equations

```
Matrix = np.matrix([[1, -1, 0, 0, 0, 0, 100],  
                    [0, -1, 1, 0, 0, 0, 50],  
                    [0, 0, 1, -1, 0, 0, 120],  
                    [0, 0, 0, -1, 1, 0, 150],  
                    [0, 0, 0, 0, 1, -1, 80],  
                    [1, 0, 0, 0, 0, 0, -1, 100]])
```

Rref_matrix = matrix.rref()

Print rref_matrix

For each row in rref_matrix:

 equation = ""

 For each item in row:

 If item == 1:

 equation += item

 print(equation)

for each variable in free_variables:

 user_input = int("Enter a value for x{variable_num}")

for each row in rref_matrix:

 equation = ""

 for each item in row:

```
        If item == 1:
            equation += item
equation += " = "
equation += row[:-1] + user_input
print(equation)
```