Chelsea Hanson
Assingment 3: Report
ICS 240-01

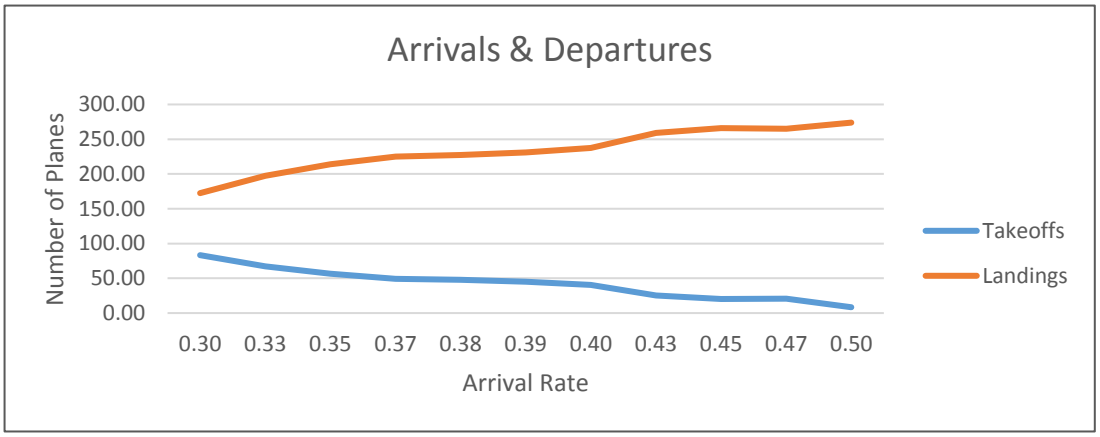
Part 1: Getting Started

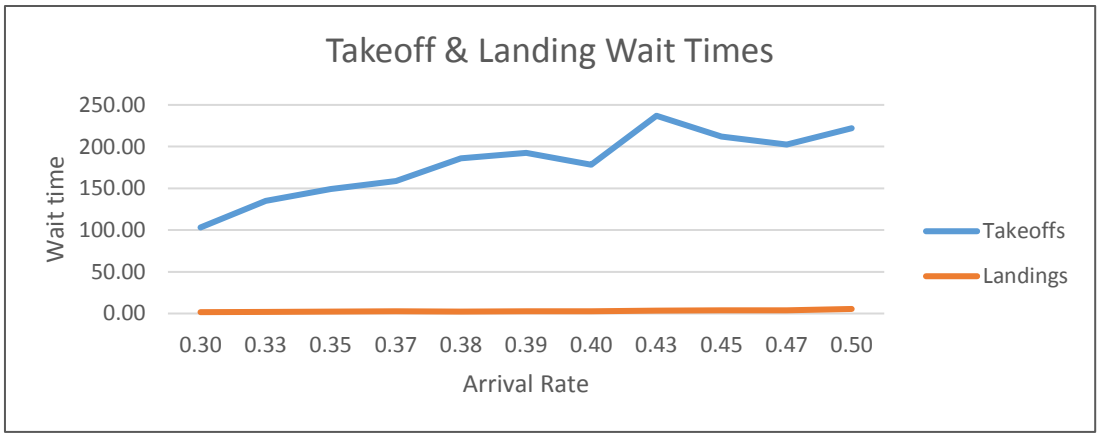
Input:	
Arrival Rate	0.45
Departure Rate	0.2
Time to Land	2
Time to Takeoff	3
Minutes of Fuel Left	10
Simulation Time	600

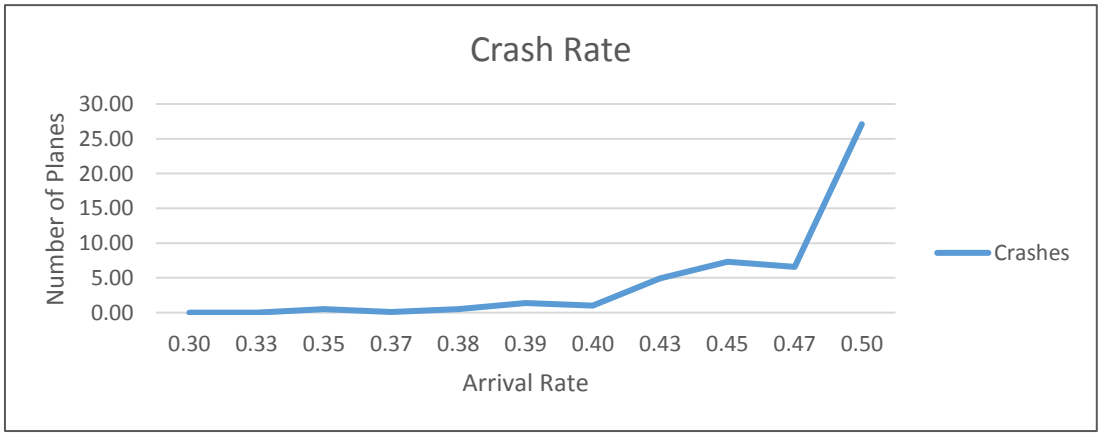
Output (average of 10 runs):	
Number of planes that took off	20.1
Number of planes that landed	265.9
Planes that crashed waiting	7.3
Average time spent in takeoff queue	212.1017
Average time spent in landing queue	4.007156

Part 2: Arrival Rate Experiment

Arrival Rate	0.30	0.33	0.35	0.37	0.38	0.39	0.40	0.43	**0.45**	0.47	0.50
Number of planes that took off	83.30	67.00	56.50	49.00	47.70	45.10	40.70	25.10	**20.10**	20.70	8.40
Number of planes that landed	172.50	197.60	214.00	225.10	227.30	230.80	237.60	258.90	**265.90**	264.90	273.90
Planes that crashed waiting	0.00	0.00	0.50	0.10	0.50	1.40	1.00	4.90	**7.30**	6.60	27.10
Average time in takeoff queue	103.11	135.02	149.28	158.91	185.90	192.46	178.22	236.98	**212.10**	202.37	222.00
Average time in landing queue	1.61	1.90	2.32	2.48	2.30	2.66	2.82	3.56	**4.01**	3.85	5.45





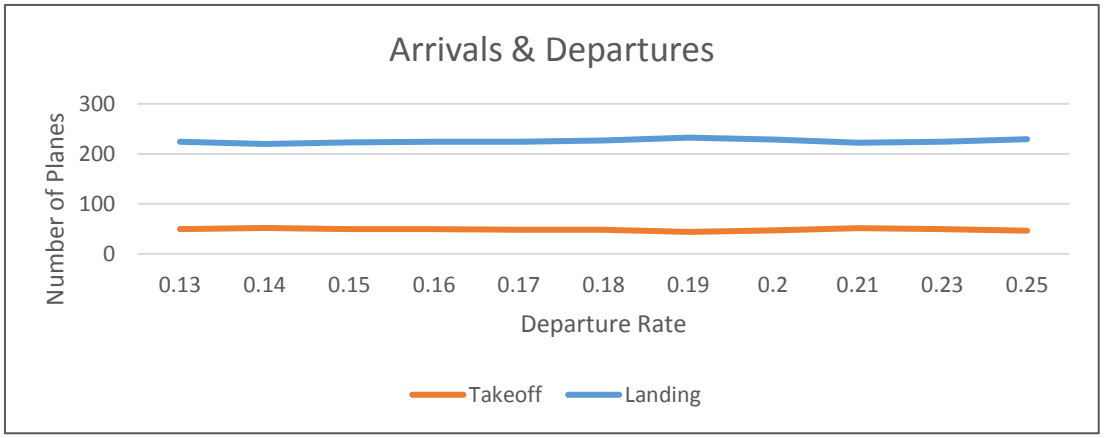


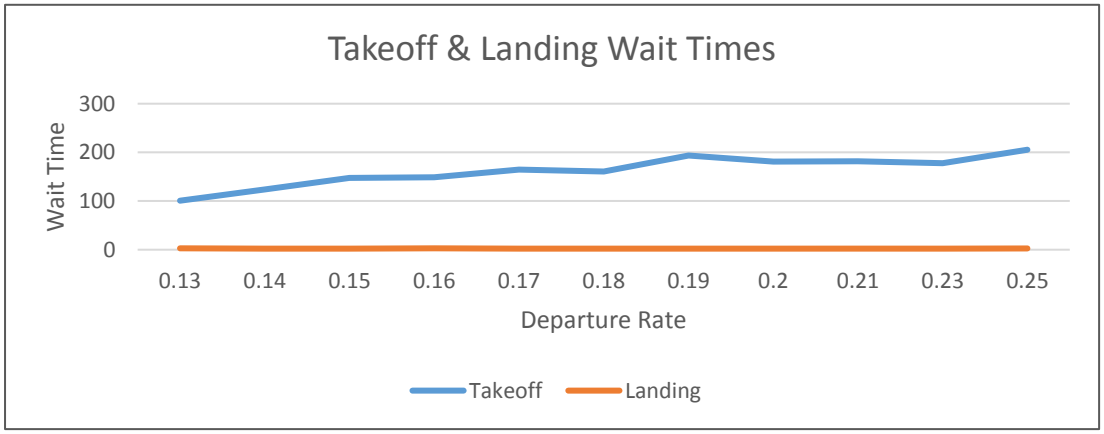
At an arrival rate around .4 is where plane crashes becomes noticeable.

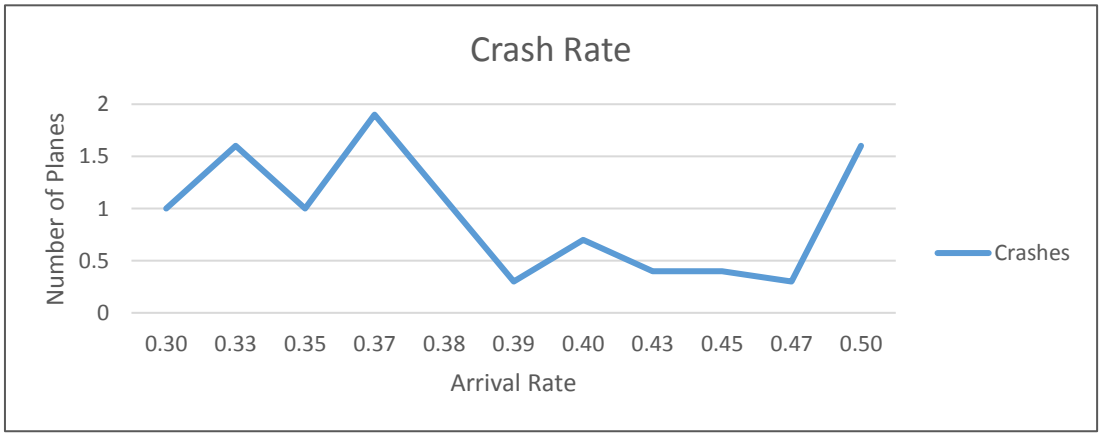
As arrival rates increase, more planes land, but more planes crash waiting.
Less planes take off, but the wait time increases.

Part 3: Departure Rate Experiment

Departure Rate	0.13	0.14	0.15	0.16	0.17	0.18	0.19	0.2	0.21	0.23	0.25
Number of planes that took off	49.7	51.8	49.6	49.5	48.5	48.3	43.9	47.1	51.3	49.2	46.5
Number of planes that landed	224.1	219.8	223.1	223.9	224	226.6	232.5	228.5	222.5	224	229.2
Planes that crashed waiting	1	1.6	1	1.9	1.1	0.3	0.7	0.4	0.4	0.3	1.6
Average time in takeoff queue	100.69	123.88	147.23	148.97	164.29	160.64	193.62	181.18	181.93	177.8	205.44
Average time in landing queue	2.5613	2.2618	2.3193	2.5464	2.3315	2.5292	2.4779	2.3015	2.2418	2.3317	2.5812







The planes don't seem to have much variation in crash rates.

Based on these results, it doesn't appear that changing the departure rates has much effect on anything other than takeoff wait times.

Part 4: Interpret Your Results

The departure rate doesn't seem to have much effect on the number of crashing planes. The only thing that seems to be affected by the departure rate is the wait time for departures.

Based on my simulation results, I think the optimal values would be an arrival rate below .4 and a departure rate below .2. This would keep crash rates minimal to none, as well as keep wait times for departure relatively low.