

## Homework 9: GazolCo's Call Center Partial Solution

No. of Agents : 14  
Average handling time : 240 sec. (04:00 min.)

1. Results of the M/M/N model are recorded in the following table:

Calls Per Hour	Average Speed of Answer (secs)	Agent's Occupancy (%)	P(Wait>0)
180	57.8	85.7%	1-0.518=0.482
185	79.6	88.1%	1-0.447=0.553
190	113.5	90.5%	1-0.37=0.63
195	171.3	92.9%	1-0.286=0.714
200	289.2	95.2%	1-0.197=0.803
205	647.0	97.6%	1-0.101=0.899
210	n/a	n/a	

The ASA, agent's occupancy and P(Wait>0) increase with the call volume. At a certain level between 205 and 210 calls per hour, 4CallCenter claims that the system is "overloaded". This corresponds to an unstable Markov process- the system had reached the point where  $\rho \geq 1$  ( $\rho = \text{arrival rate} * \text{handling time} / \text{agents}$ ). Specifically, this occurs when the call volume  $\geq 14 * 3600 / 240 = 210$  calls per hour.