Example: Reservation Management

Marty Ford is an operations analyst for Piedmont Commuter Airlines (PCA). Recently, Marty was asked to make a recommendation on how many reservations PCA should book on Flight 343 – a flight from a small regional airport in New England to a major hub at Boston's Logan airport. The plane used on Flight 343 is a small twin-engine turbo-prop with 19 passenger seats available. PCA sells nonrefundable tickets for Flight 343 for $150 per seat.

Industry statistics show that for every ticket sold for a commuter flight, a 0.10 probability exists that the ticket holder will not be on the flight. Thus, if PCA sells 19 tickets for this flight, there is a fairly good chance that one or more seats on the plane will be empty. Of course, empty seats represent lost potential revenue to the company. On the other hand, if PCA overbooks this flight and more than 19 passengers show up, some of them will have to be bumped to a later flight.

To compensate for the inconvenience of being bumped, PCA gives these passengers vouchers for a free meal, a free flight at a later date, and sometimes also pays for them to stay overnight in a hotel near the airport. PCA pays an average of $325 (including the cost of lost goodwill) for each passenger that gets bumped. Marty wants to determine if PCA can increase profits by overbooking this flight and, if so, how many reservations should be accepted to produce the maximum average profit. To assist in the analysis, Marty analyzed market research data for this flight that reveals the following probability distribution of demand for this flight:

Seats Demanded	14	15	16	17	18	19	20	21	22	23	24	25
Probability	0.03	0.05	0.07	0.09	0.11	0.15	0.18	0.14	0.08	0.05	0.03	0.02

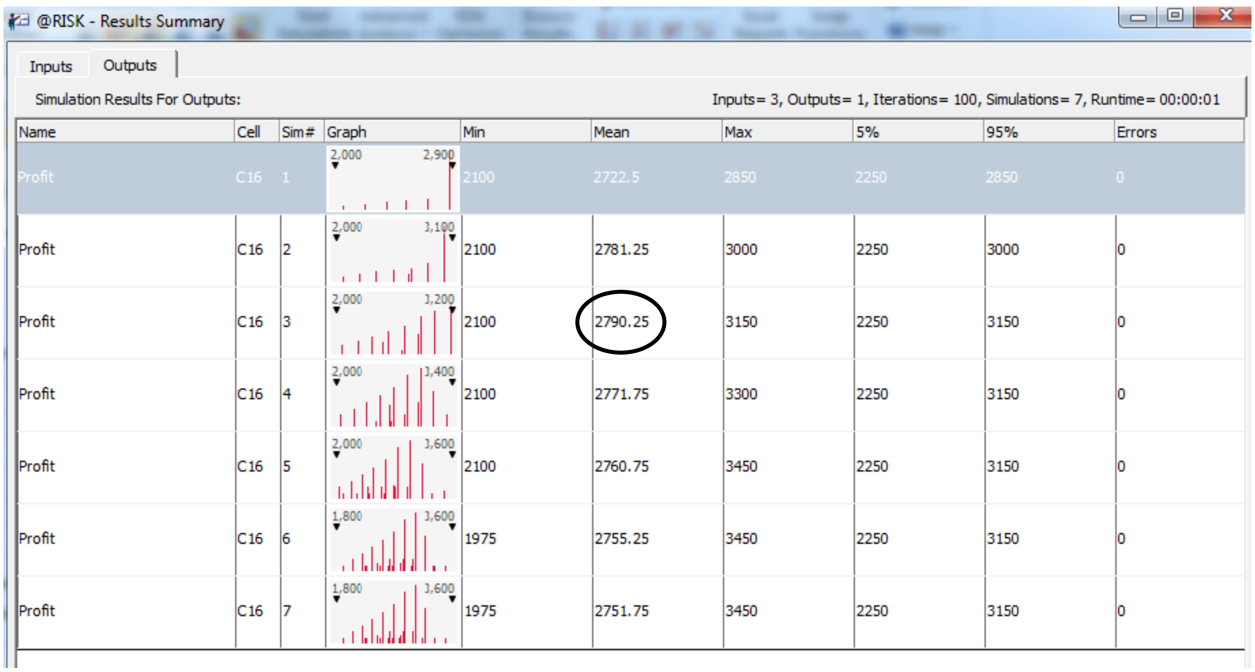
<u>Specify the following @Risk Model in Excel:</u>

	A	B	C	D	E	F	G	H
1	**Piedmont Commuter Airlines**							
2	(from Spreadsheet Modeling and Decision Analysis by Ragsdale)							
3								
4		Seats Available	19		Demand	Probability		Max # of Reservations to Accept
5		Ticket Price per Seat	$150		14	0.03		19
6		Prob. of No-Show	0.1		15	0.05		20
7		Cost of Bumping	$325		16	0.07		21
8		Max # of Reservations to Accept	=RiskSimTable(H5:H11)		17	0.09		22
9					18	0.11		23
10		Seats Demanded	=RiskDiscrete(E5:E16,F5:F16)		19	0.15		24
11		Tickets Sold	=min(C8,C10)		20	0.18		25
12		Passengers Wanting to Board	=RiskBinomial(C11,1-C6)		21	0.14		
13					22	0.08		
14		Ticket Revenue	=C5*C11		23	0.05		
15		Cost of Bumping	=C7*max(C12-C4,0)		24	0.03		
16		Profit	=C14-C15		25	0.02		

Choose simulation settings:

Iterations = 10,000
Simulations = 7

@Risk Results Summary:


@RISK - Results Summary

Inputs | Outputs

Simulation Results For Outputs: Inputs= 3, Outputs= 1, Iterations= 100, Simulations= 7, Runtime= 00:00:01

Name	Cell	Sim#	Graph	Min	Mean	Max	5%	95%	Errors
Profit	C16	1	2,000 2,900	2100	2722.5	2850	2250	2850	0
Profit	C16	2	2,000 3,100	2100	2781.25	3000	2250	3000	0
Profit	C16	3	2,000 3,200	2100	2790.25	3150	2250	3150	0
Profit	C16	4	2,000 3,400	2100	2771.75	3300	2250	3150	0
Profit	C16	5	2,000 3,600	2100	2760.75	3450	2250	3150	0
Profit	C16	6	1,800 3,600	1975	2755.25	3450	2250	3150	0
Profit	C16	7	1,800 3,600	1975	2751.75	3450	2250	3150	0

What's the optimal maximum # of reservations to accept?

The optimal maximum # of reservations to accept is 21 because it yields the highest mean profit.