

### Problem 6.113

As reported by a spokesperson for SA, the no-show rate for reservations is 16%. In other words, the probability is 0.16 that a person making a reservation will not take the flight. For the next flight 42 people have reservations. What is the probability that:

- a) Exactly 5 do not take the flight?
- b) Between 9 and 12, inclusive, do not take the flight?
- c) At least one does not take the flight?
- d) At most two do not take the flight?

### Given:

$P = 0.16$ ;  $n=42$

**Question:** Can we use the normal approximation to the binomial?

- 1)  $np = (0.16)(42) = 6.72$  -- which is greater than 5
- 2)  $np(1-p) = 5.6448$  -- which is greater than 5

YES! Since both 1 & 2 are greater than 5.

### Compute:

Mean =  $np = 6.72$

Standard deviation =  $\text{Sqrt}(5.6448) = 2.3758$

### Solution for (a)

$P(x=5) = ?$

Subtracting 0.5 from 5 = 4.5; Implied  $z = [(4.5 - 6.72) / 2.3758] = -0.93$  which gives a table value of 0.1762

Adding 0.5 to 5 = 5.5; Implied  $z = [(5.5 - 6.72) / 2.3758] = -0.51$  which gives a table value of 0.3050

Thus, the probability is  $0.3050 - 0.1762 = 0.1288$  or 12.88%

### **Solution for (b)**

$$P(9 \leq x \leq 12) = ?$$

Subtracting 0.5 from 9 = 8.5; Implied  $z = [(8.5 - 6.72) / 2.3758] = 0.75$  which gives a table value of 0.7734

Adding 0.5 to 12 = 12.5; Implied  $z = [(12.5 - 6.72) / 2.3758] = 2.43$  which gives a table value of 0.9925

Thus, the probability is  $0.9925 - 0.7734 = 0.2191$  or 21.91%

### **Solution for (c)**

$$P(1 \leq x \leq 42) = ?$$

Subtracting 0.5 from 1 = 0.5; Implied  $z = [(0.5 - 6.72) / 2.3758] = -2.62$  which gives a table value of 0.0044

Adding 0.5 to 42 = 42.5; Implied  $z = [(42.5 - 6.72) / 2.3758] = 15.06$  which gives a table value of 1.0

Thus the probability is  $1 - 0.0044 = 0.9956$  or 99.56%

### **Solution for (d)**

$$P(x \leq 2) = ? \text{ Is the same as } P(0 \leq x \leq 2) = ?$$

Subtracting 0.5 from 0 = -0.5; Implied  $z = [(-0.5 - 6.72) / 2.3758] = -3.04$  which gives a table value of 0.0012

Adding 0.5 to 2 = 2.5; Implied  $z = [(2.5 - 6.72) / 2.3758] = -1.77$  which gives a table value of 0.0384

Thus, the probability is  $0.0384 - 0.0012 = 0.0372$  or 3.72%