

Formulas for BA3352 Exams

Reminder for STAT 3360:

Mean Formula for a population $\{X_1, X_2, \dots, X_N\}$: $\bar{X} = \frac{\sum_{i=1}^N X_i}{N}$

Variance Formula for a population $\{X_1, X_2, \dots, X_N\}$: $\text{Var}(X) = \frac{\sum_{i=1}^N (X_i - \bar{X})^2}{N}$

BA3352 Formulas:

For Midterm 1:

Linear Trend Forecast: $F_t = a + bt$

$$b = \frac{n \sum ty - \sum t \sum y}{n \sum t^2 - (\sum t)^2} \quad a = \frac{\sum y - b \sum t}{n}$$

Forecasting: Exponential Smoothing. $F_t = \alpha A_{t-1} + (1 - \alpha)F_{t-1}$

$$MAPE = \frac{100 \sum e_t / \text{Actual}_t}{n}$$

For Midterm 2:

Layout:

$$\text{Output Capacity} = \frac{OT}{CT}, \quad CT = \frac{OT}{D}, \quad N_{min} = \frac{\sum t}{CT}$$

Excel's Normal Probability functions: $\text{normdist}(x, \text{mean}, \text{stdev}, 0)$ normal p.d.f. at x ;
 $\text{normdist}(x, \text{mean}, \text{stdev}, 1)$ normal cdf at x ; $\text{norminv}(\text{prob}, \text{mean}, \text{stdev})$ inverse cdf at prob.

Control charts:

Mean Chart: $UCL = \text{Average of Sample Means} + z \cdot \text{StDev of Sample Means}$
where we choose z so that Type I probability is α .

Range Chart: $UCL = D_4 \bar{R}$ and $LCL = D_3 \bar{R}$
where D_4 and D_3 are tabulated in Table 10-2.

For Midterm 3:

For p-chart with sample size n :

$$\text{StDev of Sample Mean} = \left\{ \frac{\bar{p}(1 - \bar{p})}{n} \right\}^{0.5}$$

For c-chart:

$$\text{StDev of Sample Mean} = \{ \text{Average of Sample Means} \}^{0.5}$$

Let r be the number of runs in K samples:

$$\text{Expected value}(r) = \frac{2K - 1}{3} \quad \text{StDev}(r) = \left\{ \frac{16K - 29}{90} \right\}^{0.5}$$

Economic Production Quantity:

$$TC(Q) = \frac{Q}{2} \left(\frac{p-D}{p} \right) H + \frac{D}{Q} S + P \cdot D$$

Inventory service levels:

$$DLT = \text{Demand during Lead Time} = \sum_{i=1}^{LT} D_i$$

$$Var(DLT) = L\sigma_D^2 + D^2\sigma_{LT}^2$$

$$CSL = P(DLT \leq ROP)$$

Assuming the normality of DLT , specific formulas from the textbook:

$$ROP = \bar{d} \times LT + z(LT)^{0.5} \sigma_d \text{ if only demand is probabilistic}$$

$$ROP = d \times \bar{LT} + z d \sigma_{LT} \text{ if only lead time is probabilistic}$$

$$ROP = \bar{d} \times \bar{LT} + z \{ \bar{LT} \sigma_d^2 + \bar{d}^2 \sigma_{LT}^2 \}^{0.5} \text{ in general}$$

Areas under the standard normal curve from $-\infty$ to z :

z	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3
Area	0.54	0.58	0.62	0.66	0.69	0.73	0.76	0.79	0.82	0.84	0.86	0.88	0.9
z	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6
Area	0.919	0.933	0.945	0.955	0.964	0.971	0.977	0.982	0.986	0.989	0.992	0.994	0.995