1) Simple Exponential Smoothing (1)

$$f_{t+1} = \alpha Y_t + (1-\alpha) f_t$$

f_{t+1} — forecast for the next

Y_t = actual value of time t

F_t — forecast for the time t

α — Smoothing Constant ($0 < \alpha < 1$)

	Sales (Y)		
Jan	120		
Feb	130	—	120
March	128		
April	133		
May	129		

Initial forecast for Jan $f_1 = Y_1 = 120$

Smoothing factor 0.5

$f_2 = 0.5 \times 120 + (1-0.5) \times 120 = 120$

$f_3 = 0.5 \times 130 + 0.5 \times 120 = 125$

$f_4 = 0.5 \times 128 + 0.5 \times 125 = 126.5$

$f_5 = 0.5 \times 133 + 0.5 \times 126.5 = 129.75$

(9)

$f_6 = 0.5 \times 129 + 0.5 \times 129.75 = 129.375$

Double Exponential Smoothing (Holt's Method)

(1) Level Equation –

$$L_t = \alpha Y_t + (1-\alpha)(L_{t-1} + T_{t-1})$$

(2) Trend Equation

$$T_t = \beta(L_t - L_{t-1}) + (1-\beta) T_{t-1}$$

(3) Forecast Equation

$$F_{t+m} = L_t + m \cdot T_t$$

– F_{t+m} means – forecast m period ahead

L_t – estimate level at time t

T_t – estimate Trend at time t

F_{t+m} – forecast m Period ahead.

α = Smoothing Parameter for level $(0<\alpha<1)$

β – Smoothing Parameter for Trend $(0<\beta<1)$

Period	Actual Demand (Y)
1	100
2	110
3	123
4	130
5	142

Answer $\alpha = 0.5$

$\beta = 0.5$

Initial level $L_1 = Y_1 = 100$

Initial Trend $T_1 = Y_2 - Y_1 = 110 - 100 = 10$

Period 2

$L_2 = 0.5 \times 110 + 0.5 \times (100 + 10) = 110$

$T_2 = 0.5 \times (110 - 100) + 0.5 \times 10 = 10$

Period 3

$L_3 = 0.5 \times 123 + 0.5 \times (110 + 10) = 61.5 + 60 = 121.5$

$T_3 = 0.5 \times 1$