

1st exercise:

$$1- E = (\sin x - \cos x - 1)(\sin x - \cos x + 1)$$

$$= [(\sin x - \cos x) - 1][(\sin x - \cos x) + 1]$$

$$= (\sin x - \cos x)^2 - 1^2$$

$$= \sin^2 x - 2 \sin x \cos x + \cos^2 x - 1$$

(Pythagorean-identity. $\cos^2 x + \sin^2 x = 1$)

$$= 1 - 2 \sin x \cos x - 1$$

$$E = -2 \sin x \cos x$$

2. The mean of the ages is = $\frac{x_1 n_1 + x_2 n_2 + \dots + x_5 n_5}{N}$

$$\text{So, } \frac{[15(9) + 16(11) + 17(x) + 18(9) + 19(y)]}{40} = 16.8$$

→ hence, $17x + 19y = 199$.

but, Total frequency is 40.

$$\text{So, } 9 + 11 + x + 9 + y = 40$$

→ hence, $x + y = 11$

To find x & y solve the system: $\begin{cases} 17x + 19y = 199 \dots \textcircled{1} \\ x + y = 11 \dots \textcircled{2} \end{cases}$

$$\begin{cases} 17x + 19y = 199 \\ -17x - 17y = -187 \end{cases} \text{ add}$$

$$2y = 12$$

$$y = 6$$

Sub value of y in eqn(2) to get:

$$x + 6 = 11$$

$$\text{thus, } x = 5$$