

$$2) a) \begin{cases} x+y = 180 \times (-2) \text{ (1)} \\ 6x+15y = 1800 \div (3) \end{cases}$$

$$\begin{cases} -2x - 2y = -360 \\ 2x + 5y = 600 \end{cases} \text{ add}$$

$$3y = 240$$

$$\boxed{y = 80}$$

Sub value of y in eqn (1) to get.

$$x+y = 180$$

$$x = 180 - 80$$

$$\boxed{x = 100}$$

b) Statement-1: $x+y = 180 \$$.

Statement-2: $(1 - \frac{40}{100})x + (1 + \frac{50}{100})y = 180 \$$.

$$(0.6x + 1.5y = 180) \times 10$$

$$6x + 15y = 1800$$

The formed system is equivalent to system of part a. Thus, they admit same solution.

Thus, price of 1st item $x = 100 \$$

And " " 2nd item $y = 80 \$$.

$$\begin{aligned} 3) E(x) &= 4(x+1)^2 + (8x+8)(x-5) \\ &= 4(x+1)^2 + 8(x+1)(x-5) \\ &= 4(x+1)[(x+1) + 2(x-5)] \\ &= 4(x+1)(3x-9) \end{aligned}$$

$$E(x) = 12(x+1)(x-3)$$

b) $BC = \frac{(7+4\sqrt{2})(7-4\sqrt{2}) + 16}{\sqrt{5^2 - 4^2}} = 5$