$$\binom{52}{5} = \frac{52!}{47!\,5!}$$

$P(1 \text{ pair}) = ?$

$$\underbrace{\boxed{X}\ \boxed{50}\times\boxed{48}\times\boxed{X}\times\boxed{47}}_{\text{nb of 1 pair among these 5 cards ?}}$$

$\binom{13}{1}\binom{4}{2} = 13\times 6 = 78$ of 1-pair (type-wise / Kind-wise)

$$? = C_5^2 = \binom{5}{2} = \frac{5!}{(5-2)!\,2!} = \frac{\cancel{5!}}{\cancel{3!}\,2!} = \frac{5\times 4}{2} = 10 \text{ (place-wise)}$$

$$P(\text{event}) = \frac{\text{nb of occurences of the event}}{\text{nb of total possibilities}}$$

$$P(1\text{-pair}) = \frac{\cancel{52}\times 10}{\cancel{52}\times 51\times 50\times 49\times 48} = \frac{10}{51\times 50\times 49\times 48} = \cancel{1{,}6\times 10^{-6}}$$

Wrong

$$P(1\text{-pair}) = \frac{\text{nb of occurences of 1-pair among 5-cards}}{\text{nb of total possibilities for 5-card sample}} = \frac{78\times 10\times \cancel{50}\times\cancel{48}\times 47}{\frac{52\times 51\times\cancel{50}\times 49\times\cancel{48}}{5!}} = \frac{78\times 10\times 47}{\frac{52\times 51\times 49}{120}} =$$

$$\frac{120\times 78\times 10\times 47}{52\times 51\times 49} = \frac{4\,399\,200}{\quad}$$

# Method 2:

$$P(1\ \text{pair}) = \frac{\binom{13}{1}\binom{4}{2}\binom{12}{3}\binom{4}{1}^3}{\binom{52}{5}} =$$

$$\frac{1098240}{2598960} = 0.423$$