

Please do not write on this exam paper and do not forget to give it back at the end of the test

**Subject 17 – STATISTICS & PROBABILITIES**

The box and whisker diagram below gives the distribution of monthly wages (salaries) of an industrial sector in France. The **decile 1** is  $D_1 = € 900$  and the **decile 9** is  $D_9 = € 3,000$ . Since the number of employees is very high, we can say that 10 % of the employees earn less than € 900 and 90 % of the employees earn more than € 900. We can make analogous lectures for the other parameters of the diagram. *(The maximum € 4,500 don't respect the scale, on the diagram).*



Find out the **only one** possible answer, and justify it:

<p><b>1°) The median wage is:</b></p> <p>a) the salary of half of the employees;</p> <p>b) the midpoint between € 800 and € 4,500;</p> <p>c) 1 400 €.</p>	<p><b>2°) The average wage is:</b></p> <p>a) inferior to the median wage;</p> <p>b) superior to the median wage;</p> <p>c) we cannot conclude</p>
<p><b>3°) 10 % of the employees have:</b></p> <p>a) a wage inferior to € 1,100;</p> <p>b) a wage superior to € 3,000;</p> <p>c) a wage between € 1,100 and € 1,400.</p>	<p><b>4°) The percentage of employees having a salary between € 900 and € 1,100 is:</b></p> <p>a) 25 %;</p> <p>b) 15 %;</p> <p>c) 10 %.</p>
<p><b>5°) We choose, at random, three employees. The probability (*) that the 3 employee have a wage superior to € 3,000 is:</b></p> <p>a) <math>(1/4)^3</math>;</p> <p>b) <math>(1/10)^3</math>;</p> <p>c) <math>3 \times 1/10</math></p>	<p><b>6°) We choose, at random, three employees. The probability (*) that no employee has a wage inferior to € 900 is:</b></p> <p>a) 0.729;</p> <p>b) 0.001;</p> <p>c) <math>1 - (1/10)^3</math>.</p>

**7°) We choose  $n$  employees at random. The probability (\*) that at least an employee has a salary between € 1,100 and € 1,900 is:**

- a) clearly superior to 0.5 when  $n$  is equal to 3.
- b) inferior to 0.5 when  $n$  is equal to 2;
- c) superior to 0.999 when  $n$  is equal to 9.

(\*) The number of employees is sufficiently high to assimilate this draw (tirage) to a draw with putting back. *(Indication: for the last 3 questions, you may draw a probability tree).*