

## STEP II, 2023, Q12 EC

### Question 12

This was the more popular of the two “Probability and Statistics” questions and a larger number of substantial attempts was seen.

Part (i) was generally completed well although in some cases there was insufficient explanation that “ $Y \leq t$ ” is equivalent to “ $X_i \leq t$  for all  $i$ ”.

Many candidates successfully calculated the value of  $m(n)$  for part (ii), but some only stated that  $m(n)$  increases, rather than considering the value of the limit.

In part (iii) many candidates successfully showed the formula for  $\mu(n)$ . A number of candidates attempted to prove that  $\mu(n)$  is increasing by differentiating with respect to  $n$  and showing that this is a positive quantity. However, none of these candidates were able to produce a fully correct version of this approach.

In part (iii) (b) most candidates were able to calculate  $\mu(2)$  correctly, but then a number of errors were seen in the subsequent argument. Common errors were to fail to consider which choice of square root is appropriate and to omit to consider the effect of squaring on an inequality.



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