# BD *[13 marks]*

A six-sided biased die is weighted in such a way that the probability of obtaining a "six" is $\frac{7}{10}$.

1a. The die is tossed five times. Find the probability of obtaining at most three "sixes". *[3 marks]*

1b. The die is tossed five times. Find the probability of obtaining the third "six" on the fifth toss. *[3 marks]*

A factory manufactures lamps. It is known that the probability that a lamp is found to be defective is $0.05$. A random sample of $30$ lamps is tested.

2a. Find the probability that there is at least one defective lamp in the sample. *[3 marks]*

2b. Given that there is at least one defective lamp in the sample, find the probability that there are at most two defective lamps. *[4 marks]*