

Q1

[Maximum mark: 5]



Let $f(x) = a(x - h)^2 + k$. The vertex of the graph of f is at $(3, 4)$ and the graph passes through $(1, -4)$.

(a) Write down the value of h and k .

[2

(b) Find the value of a .

[3

$$f(x) = a(x - 3)^2 + 4$$

$$-4 = a(1 - 3)^2 + 4$$

$$-8 = a(4)$$

$$-2 = a$$

PRIOR KNOWLEDGE NEEDED:

① calculate the mean of a frequency distribution:

x	0	1	2	3
Freq.	3	6	9	2

$$\bar{x} = \frac{\sum f(x)}{\sum f} = \frac{(0 \times 3) + (1 \times 6) + (2 \times 9) + (3 \times 2)}{3 + 6 + 9 + 2} = 1.5$$

② Evaluate $\binom{5}{2}$ = $\frac{5!}{(2!)(3!)}$
combination
 ${}^n C_r$

③ Solve $\frac{x-2.5}{1.2} = 0.4$ $x = 2.98$

Chapter 15: Probability Distributions

15.1 Random Variables

Random Variable: a quantity whose value depends on chance

$p(x)$ A (capital letters)

Discrete Random Variable: a random variable that has a **finite** number of possible values (ie. # of kids, sides to a die)

Continuous Random Variable: can take on any value in an interval (ie. miles driven, time to complete a task.)

def A PROBABILITY DISTRIBUTION FOR A DISCRETE RANDOM VARIABLE IS A LIST OF EACH POSSIBLE VALUE OF THE RANDOM VARIABLE AND THE PROBABILITY THAT EACH OUTCOME OCCURS.

Ex X IS THE NUMBER OF SIXES OBTAINED WHEN A FAIR DIE IS ROLLED 3 TIMES.

6's / # of rolls
 HW 15A
 P. 522 #5, 7, 8

X	0	1	2	3
$P(X=x)$	$\frac{125}{216}$	$\frac{25}{72}$	$\frac{5}{72}$	$\frac{1}{216}$

add up + 1

Ex X IS DISTRIBUTED:

X	1	2	3	4	5
$P(X=x)$	$7c$	$5c$	$4c$	$3c$	c

a) find the value of $c = \frac{1}{20}$ $7c + 5c + 4c + 3c + c = 1$
 $20c = 1$

b) Find $P(X \geq 4) = 3\left(\frac{1}{20}\right) + 1\left(\frac{1}{20}\right) = \frac{1}{5}$ $c = \frac{1}{20}$

Expected value

$$E(X) = \sum x P(X=x)$$

X	0	1	2	3
P(X=x)	$\frac{125}{126}$	$\frac{25}{72}$	$\frac{5}{72}$	$\frac{1}{14}$

$$E(X) = 0\left(\frac{125}{126}\right) + 1\left(\frac{25}{72}\right) + 2\left(\frac{5}{72}\right) + 3\left(\frac{1}{14}\right)$$
$$= \frac{1}{2}$$

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