

9C : Binomial Probability

Binomial Distribution Worksheet

Name: _____

* Show work/formula AND final % for all

~~For 1-2, write out answers in long hand form, then use a calculator to check your answers.~~

1. A bag contains 15 balls, numbered from 1-15. Five selections, with replacement, are made from the bag. Find the probability that

{a} all balls selected have numbers greater than 10

{b} exactly three balls selected have numbers greater than ten

2. Assuming that a woman is equally likely to give birth to a girl or a boy, find the probability that if she has a family of 6 children, 3 of them are girls and 3 are boys.

~~Problems 3-6: Using the calculator to solve these problems is permissible, but show your work.~~

3. From a regular pack of 52 playing cards, a card is drawn, at random, and replaced. This trial is carried out 8 times. Find the probability of drawing an ace on at least 2 occasions.

4. Over a long period, the proportion of defective items in a manufacturing process is 5%. In a random sample of 25, find the probability of

{a} no defectives

{b} exactly two defectives

{c} more than two defectives

5. Find the probabilities of obtaining

{a} at least one 'six' in 6 throws of a die

{b} at least two 'sixes' in 12 throws

{c} at least three 'sixes' in 18 throws of a die

{d} at least 4 'sixes' in 24 throws of a die

6. A bus holds 48 passengers. On average, one passenger in every 16 who books a seat fails to turn up. Stating carefully any assumptions made, find the probability that, if the booking office accepts 50 bookings, there will not be enough seats.

~~Do this problem by hand:~~

7. A bag contains a large number of balls of which 25% are blue. The rest are yellow. If 7 balls are taken from a bag, find the probability that

{a} they are all yellow

{b} exactly 2 are blue

8. A company makes 1.5 volt batteries, and its quality control department estimates that 0.7% of the batteries are defective. If a sample of 20 batteries is taken, find the probability that

{a} exactly one is defective {b} more than one are defective {c} less than two are defective

The batteries are sold in packets of 8. Find the probability that

{d} a pack contains no defective batteries

{e} a consignment of 10 packs contains less than 2 packs with defective batteries

9. Experience has shown that at a busy highway intersection, the probability on any given day that an accident occurs is 0.008

{a} Show that the probability of at least one accident in a randomly selected week is approximately 5%

Hence, find the probability that, in a randomly selected four-week period,

{i} all 4 weeks are accident free {ii} 3 of the weeks are accident free

{iii} 2 of the weeks are accident free

Binomial Distribution Worksheet

Name: Answer key

* You must show me your work for a detailed solution

For 1-2, write out answers in long hand form, then use a calculator to check your answers.

1. A bag contains 15 balls, numbered from 1-15. Five selections, with replacement, are made from the bag. Find the probability that

{a} all balls selected have numbers greater than 10 10.41%

{b} exactly three balls selected have numbers greater than ten 16.46%

2. Assuming that a woman is equally likely to give birth to a girl or a boy, find the probability that if she has a family of 6 children, 3 of them are girls and 3 are boys. 31.25%

Problems 3-6: Using the calculator to solve these problems is permissible, but show your work.

3. From a regular pack of 52 playing cards, a card is drawn, at random, and replaced. This trial is carried out 8 times. Find the probability of drawing an ace on at least 2 occasions. 12.15%

4. Over a long period, the proportion of defective items in a manufacturing process is 5%. In a random sample of 25, find the probability of

{a} no defectives 27.74% {b} exactly two defectives 23.05% {c} more than two defectives 12.71%

5. Find the probabilities of obtaining

{a} at least one 'six' in 6 throws of a die {b} at least two 'sixes' in 12 throws

46.51% 61.87%
 {c} at least three 'sixes' in 18 throws of a die {d} at least 4 'sixes' in 24 throws a die
 59.73% 58.45%

6. A bus holds 48 passengers. On average, one passenger in every 16 who books a seat fails to turn up. Stating carefully any assumptions made, find the probability that, if the booking office accepts 50 bookings, there will not be enough seats. 17.19%

Do this problem by hand:

7. A bag contains a large number of balls of which 25% are blue. The rest are yellow. If 7 balls are taken from a bag, find the probability that

{a} they are all yellow 13.35% {b} exactly 2 are blue 31.1%

8. A company makes 1.5 volt batteries, and its quality control department estimates that 0.7% of the batteries are defective. If a sample of 20 batteries is taken, find the probability that

{a} exactly one is defective {b} more than one are defective {c} less than two are defective
 12.25% 10.86% 99.14%

The batteries are sold in packets of 8. Find the probability that

{d} a pack contains no defective batteries 94.5%

{e} a consignment of 10 packs contains less than 2 packs with defective batteries 89.86%
 *May vary SLIGHTLY due to rounding (w/in 0.1)

9. Experience has shown that at a busy highway intersection, the probability on any given day that an accident occurs is 0.008

{a} Show that the probability of at least one accident in a randomly selected week is approximately 5% *set up problem + verify $P = 0.05467378$

Hence, find the probability that, in a randomly selected four-week period,

{i} all 4 weeks are accident free {ii} 3 of the weeks are accident free

79.86% 18.48%
 {iii} 2 of the weeks are accident free

11.6%