

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

1

$C$  and  $D$  are two events where  $P(C|D) = \frac{1}{3}$ ,  $P(C|D') = \frac{1}{5}$  and  $P(D) = \frac{1}{4}$ . Find:

(a)  $P(C \cap D)$

(b)  $P(C \cap D')$

(c)  $P(C)$

(d)  $P(D|C)$

(e)  $P(D'|C)$

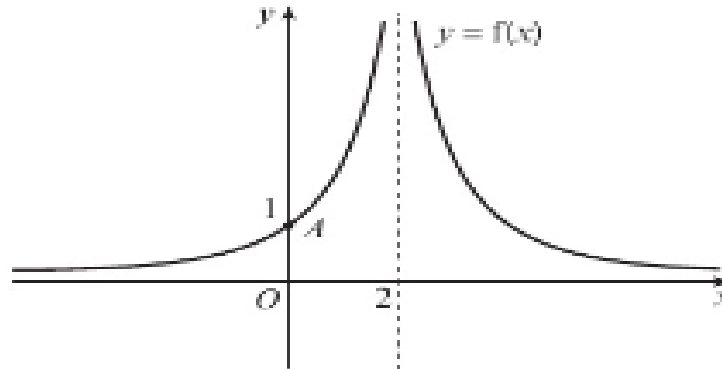
(f)  $P(D'|C')$

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

2



The diagram shows a sketch of the graph  $y = f(x)$ .

The lines  $x = 2$  and  $y = 0$  (the  $x$ -axis) are asymptotes to the curve.

On separate axes, sketch the graphs of:

- (a)  $y = 3f(x) - 1$
- (b)  $y = f(x + 2) + 4$
- (c)  $y = -f(2x)$
- (d)  $y = f(|x|)$

For each new part, state the equations of the asymptotes and the new coordinates of the point  $A$ .

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

3

The probability distribution of a discrete random variable  $X$  is given by:

$$\begin{array}{ll} P(X = r) = k(6r^2 - r^3) & \text{for } r = 1, 2, 3, 4, 5 \\ P(X = r) = 0 & \text{otherwise} \end{array}$$

- (a) Show that  $k = \frac{1}{105}$
- (b) Show the probability distribution for  $X$  on a suitable diagram.
- (c) Write down the value of the mode of the distribution.
- (d) Find the value of  $P(2 \leq X \leq 4)$

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

4

Serving against her regular opponent, a tennis player has a 65% chance of getting her first serve in. If her first serve is in she then has a 70% chance of winning the point but if her first serve is not in, she only has a 45% chance of winning the point.

(a) Represent this information on a tree diagram.

For a point on which this player served to her regular opponent, find the probability that

- (b) she won the point,
- (c) her first serve went in given that she won the point,
- (d) her first serve didn't go in given that she lost the point.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

5

Ten years ago the residents in a car congested area were asked whether they were in favour of a residents' parking scheme. The proportion of residents who supported the parking permit scheme was 30%. The scheme was never implemented due to a lack of funding.

The fund is now available and a new councillor believes that the support for the scheme is different now.

The replies of a questionnaire of twenty current residents are considered.

- (a) State the hypothesis clearly
- (b) Determine the critical region at the 5% significance level,
- (c) State that actual significance level

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

5b

The diameters of eggs of the little-gull are approximately normally distributed with mean 4.11 cm and standard deviation 0.19 cm.

(a) Calculate the probability that an egg chosen at random has a diameter between 3.9 cm and 4.5 cm.

A sample of 8 little-gull eggs was collected from a particular island and their diameters, in cm, were:

4.4,      4.5,      4.1,      3.9,      4.4,      4.6,      4.5,      4.1

(b) Assuming that the standard deviation of the diameters of eggs from the island is also 0.19 cm, test, at the 1% level, whether the results indicate that the mean diameter of little-gull eggs on this island is different from elsewhere.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

5c

A particular breakfast cereal as prizes in 56% of the boxes. A random sample of 100 boxes is taken.

- (a) Find the exact value of the probability that exactly 55 boxes contain a prize.
- (b) Find the percentage error when using a normal approximation to calculate the probability that exactly 55 boxes contain prizes.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

6

By writing each of these functions in the form given, state the greatest value of each function and the smallest positive value of  $x$  (in radians to 2dp) at which this occurs.

- (a)  $8 \cos x - 15 \sin x, R \cos(x + \alpha)$
- (b)  $5 \sin x + 12 \cos x, R \sin(x + \alpha)$
- (c)  $3 \sin x - \cos x, R \sin(x - \alpha)$

TAP FOR ANSWERS



# BHASIC MATHS

## A1 DOUBLES ASSIGNMENT 21A

7

Given that  $\arctan(x - 2) = -\frac{\pi}{3}$ , find the value of  $x$ .

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

8

Expand these expressions in ascending powers of  $x$  as far as the term in  $x^3$ , and state the values of  $x$  for which the expansion is valid.

(a)  $(1 + x)^{\frac{3}{2}}$

(b)  $(1 - 2x)^{\frac{1}{2}}$

(c)  $\left(1 + \frac{x}{2}\right)^{-3}$

TAP FOR ANSWERS

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 21A**

9

Find the sum of the first  $n$  terms of the geometric series  $5+15+45+\dots$ . What is the smallest number of terms whose total is more than  $10^8$ ?

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

10

(a) Show that the equation  $x^3 - x - 2 = 0$  has a root between 1 and 2

(b) Show that the equation can be rearranged to  $x = \sqrt[3]{x + 2}$

(c) Use the iterative formula  $x_{n+1} = \sqrt[3]{x_n + 2}$

And  $x_0 = 1$  find the values of  $x_1, x_2$  and  $x_3$

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

11

$$q(x) = \frac{9x^2 + 26x + 20}{(1+x)(2+x)}, |x| < 1$$

- (a) Show that the expansion of  $q(x)$  in ascending powers of  $x$  can be approximated to  $10 - 2x + Bx^2 + Cx^3$  where  $B$  and  $C$  are constants to be found.
- (b) Find the percentage error made in using the series expansion in part (a) to estimate the value of  $q(0.1)$ . Give your answer to 2 significant figures.

TAP FOR ANSWERS

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 21A**

12

Prove by contradiction that  $\sqrt[3]{2}$  is irrational.

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

14

Complete this old spec paper

[https://www.madasmaths.com/archive/iygb\\_practice\\_papers/c3\\_practice\\_papers/c3\\_r.pdf](https://www.madasmaths.com/archive/iygb_practice_papers/c3_practice_papers/c3_r.pdf)

TAP FOR ANSWERS

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

1

- (a) 0.0833 (3 s.f.)
- (b) 0.15
- (c) 0.233 (3 s.f.)
- (d) 0.357 (3 s.f.)
- (e) 0.643 (3 s.f.)
- (f) 0.783 (3 s.f.)

TAP TO RETURN

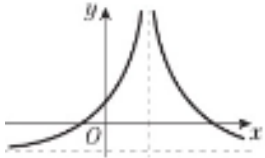


# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

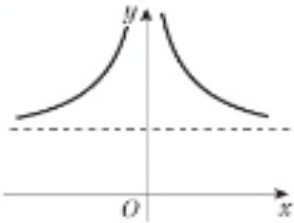
### 2 - Answers

(a)



$$A = (0, 2), x = 1, y = 0$$

(b)



$$A = (-2, 5), x = 0, y = 5$$

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 3 - Answers

(b)

$x$	1	2	3	4	5
$P(X = x)$	$\frac{1}{21}$	$\frac{16}{105}$	$\frac{9}{35}$	$\frac{32}{105}$	$\frac{5}{21}$

(c) 4

(d)  $\frac{5}{7}$

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 4 - Answers

(a) 0.6125

(b)  $\frac{26}{35}$

(c)  $\frac{77}{155}$

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 5 - Answers

(a)  $H_0: p = 0.3, H_1: p \neq 0.3,$

(b)  $x \leq 1$  and  $x \geq 11,$

(c) 2.47%

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 5b - Answers

(a) Accept 0.845 ~ 0.846

(b) Test statistic = 3.0145... > 2.5758

Significant so reject  $H_0$ . There is evidence that the mean length of eggs from this island is different from elsewhere.

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 5c - Answers

(a) 0.0786

(b) 0.26%

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 6 - Answers

(a) 17, 5.20

(b) 13, 0.395

(c)  $\sqrt{10}$ , 1.89

TAP TO RETURN

**BHAVIC MATHS**  
**A1 DOUBLES ASSIGNMENT 21A**

7 - Answers

$$2 - \sqrt{3}$$

TAP TO RETURN



# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 8 - Answers

$$(a) 1 + \frac{3}{2}x + \frac{3}{8}x^2 - \frac{1}{16}x^3, \quad -1 < x < 1$$

$$(b) 1 - x - \frac{1}{2}x^2 - \frac{1}{2}x^3, \quad -\frac{1}{2} < x < \frac{1}{2}$$

$$(c) 1 - \frac{3}{2}x + \frac{3}{2}x^2 - \frac{5}{4}x^3, \quad -2 < x < 2$$

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 21A**

9 - Answers

$$\frac{5}{2}(3^n - 1); 16$$

TAP TO RETURN

**BHASVIC MαTHS**  
**A1 DOUBLES ASSIGNMENT 21A**

10 - Answers

(a) 1.442

(b) 1.510

(c) 1.520

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 11 - Answers

(a)  $10 - 2x + \frac{5}{2}x^2 - \frac{11}{4}x^3$ , so  $B = \frac{5}{2}$  and  $C = -\frac{11}{4}$

(b) Percent error = 0.0027%

TAP TO RETURN

# BHAVIC MATHS

## A1 DOUBLES ASSIGNMENT 21A

### 12 - Answers

Assumption  $\sqrt[3]{2}$  is rational and can be written in the form  $\sqrt[3]{2} = \frac{a}{b}$  and there are no common factors between  $a$  and  $b$ .

TAP TO RETURN

# BHASVIC MαTHS

## A1 DOUBLES ASSIGNMENT 21A

### 14 - Answers

[https://www.madasmaths.com/archive/iygb\\_practice\\_papers/c3\\_practice\\_papers/c3\\_r\\_solutions.pdf](https://www.madasmaths.com/archive/iygb_practice_papers/c3_practice_papers/c3_r_solutions.pdf)

TAP TO RETURN