First Year Doubles Assignment test 17 version O

1) Solve the following equation, in the intervals given in brackets.

$6\sin x + 8\cos x = 5\sqrt{3},\ [0,\ 360°]$

2) Find $\int \frac{25x+1}{(2x-1)(x+1)^2}\,dx$

3) a) Write down two conditions under which the Normal distribution may be used as an approximation to the binomial distribution.

A company sells orchids of which 45% produce pink flowers. A random sample of 20 orchids is taken and X produce pink flowers.

b) Find the probability that 10 pink flowers are produced.

A second random sample of 240 orchids is taken.

c) Using a suitable approximation, find the probability that fewer than 110 orchids produce pink flowers.

d) The probability that at least *q* orchids produce pink flowers is 0.2. Find *q*

4. Two helicopters P and Q are moving in the same horizontal plane.

They are modelled as particles moving in straight lines with constant speeds.

At noon P is at the point with position vector (20**i** + 35**j**) km with respect to a fixed origin O.

At time t hours after noon the position vector of P is **p** km.

When $t = \frac{1}{2}$ the position vector of P is (50**i** – 25**j**) km. Find

a) the velocity of P in the form (a**i** + b**j**) km h^{-1},

b) an expression for **p** in terms of t.

At noon Q is at O and at time t hours after noon the position vector of Q is **q** km.

The velocity of Q has magnitude 120 km h^{-1} in the direction of 4**i** – 3**j**. Find

c) an expression for **q** in terms of t,

d) the distance, to the nearest km, between P and Q when t = 2.

5) a) Find the first four terms, in ascending powers of *x* , of the binomial expansion of $\left(1+\frac{x}{2}\right)^7$ giving each coefficient in exact simplified form.

b) Hence determine the coefficient of *x* in the expansion of $\left(1+\frac{2}{x}\right)^2\left(1+\frac{x}{2}\right)^7$

First Year Doubles Assignment test 17 version P

1) Solve the following equation, in the intervals given in brackets.
$2\cos 3\theta - 3\sin 3\theta = -1,\ [0,\ 90°]$

2) Find $\int \frac{5x-1}{(2x-1)(x+1)^2}dx$

3) a) Write down two conditions under which the Normal distribution may be used as an approximation to the binomial distribution.
A company sells orchids of which 44% produce pink flowers. A random sample of 25 orchids is taken and X produce pink flowers.
b) Find the probability that 10 pink flowers are produced.
A second random sample of 240 orchids is taken.
c) Using a suitable approximation, find the probability that fewer than 110 orchids produce pink flowers.
d) The probability that at least *q* orchids produce pink flowers is 0.2. Find *q*

4. Two helicopters P and Q are moving in the same horizontal plane.
They are modelled as particles moving in straight lines with constant speeds.
At noon P is at the point with position vector (30**i** + 45**j**) km with respect to a fixed origin O.
At time t hours after noon the position vector of P is **p** km.
When $t = \frac{1}{2}$ the position vector of P is (60**i** – 35**j**) km. Find
a) the velocity of P in the form (a**i** + b**j**) km h^{-1},
b) an expression for **p** in terms of t.
At noon Q is at O and at time t hours after noon the position vector of Q is **q** km.
The velocity of Q has magnitude 240 km h^{-1} in the direction of 4**i** – 3**j**. Find
c) an expression for **q** in terms of t,
d) the distance, to the nearest km, between P and Q when t = 2.

5) a) Find the first four terms, in ascending powers of *x* , of the binomial expansion of $\left(1+\frac{x}{2}\right)^8$ giving each coefficient in exact simplified form.

b) Hence determine the coefficient of *x* in the expansion of $\left(1+\frac{2}{x}\right)^2\left(1+\frac{x}{2}\right)^8$

First Year Doubles Assignment test 17 version Q

1) Solve the following equation, in the intervals given in brackets.
$8\cos\theta + 15\sin\theta = 10,\ [0,\ 360°]$

2) Find $\int \frac{5x+1}{(2x-1)(x+1)^2}dx$

3) a) Write down two conditions under which the Normal distribution may be used as an approximation to the binomial distribution.
A company sells orchids of which 43% produce pink flowers. A random sample of 30 orchids is taken and X produce pink flowers.
b) Find the probability that 10 pink flowers are produced.
A second random sample of 240 orchids is taken.
c) Using a suitable approximation, find the probability that fewer than 110 orchids produce pink flowers.
d) The probability that at least *q* orchids produce pink flowers is 0.2. Find *q*

4. Two helicopters P and Q are moving in the same horizontal plane.
They are modelled as particles moving in straight lines with constant speeds.
At noon P is at the point with position vector (40**i** + 55**j**) km with respect to a fixed origin O.
At time t hours after noon the position vector of P is **p** km.
When $t = \frac{1}{2}$ the position vector of P is (70**i** – 45**j**) km. Find
a) the velocity of P in the form (a**i** + b**j**) km h^{-1},
b) an expression for **p** in terms of t.
At noon Q is at O and at time t hours after noon the position vector of Q is **q** km.
The velocity of Q has magnitude 360 km h^{-1} in the direction of 4**i** – 3**j**. Find
c) an expression for **q** in terms of t,
d) the distance, to the nearest km, between P and Q when t = 2.

5) a) Find the first four terms, in ascending powers of *x* , of the binomial expansion of $\left(1+\frac{x}{2}\right)^9$ giving each coefficient in exact simplified form.
b) Hence determine the coefficient of *x* in the expansion of $\left(1+\frac{2}{x}\right)^2\left(1+\frac{x}{2}\right)^9$

First Year Doubles Assignment test 17 version R

1) Solve the following equation, in the intervals given in brackets.

$5\sin\frac{x}{2} - 12\cos\frac{x}{2} = 6.5,\ [-360°,\ 360°]$

2) Find $\int \frac{2x-1}{(2x+1)(x+1)^2}\,dx$

3) a) Write down two conditions under which the Normal distribution may be used as an approximation to the binomial distribution.

A company sells orchids of which 35% produce pink flowers. A random sample of 19 orchids is taken and X produce pink flowers.

b) Find the probability that 10 pink flowers are produced.

A second random sample of 240 orchids is taken.

c) Using a suitable approximation, find the probability that fewer than 100 orchids produce pink flowers.

d) The probability that at least *q* orchids produce pink flowers is 0.2. Find *q*

4. Two helicopters P and Q are moving in the same horizontal plane. They are modelled as particles moving in straight lines with constant speeds.

At noon P is at the point with position vector (x_0**i** + y_0**j**) km with respect to a fixed origin O.

At time t hours after noon the position vector of P is **p** km.

When t $= \frac{1}{2}$ the position vector of P is (x_1**i** + y_1**j**) km. Find

a) the velocity of P in the form (a**i** + b**j**) km h^{-1},

b) an expression for **p** in terms of t.

At noon Q is at O and at time t hours after noon the position vector of Q is **q** km.

The velocity of Q has magnitude 60 km h^{-1} in the direction of 4**i** – 3**j**. Find

c) an expression for **q** in terms of t,

d) an expression for the distance between P and Q when t = 2.

5) a) Find the first four terms, in ascending powers of *x* , of the binomial expansion of $\left(1+\frac{x}{2}\right)^{10}$ giving each coefficient in exact simplified form.

b) Hence determine the coefficient of *x* in the expansion of $\left(1+\frac{2}{x}\right)^2\left(1+\frac{x}{2}\right)^{10}$

Answers Version O

1) 6.9°, 66.9°

2) $3ln(|2x-1|) - 3ln(|x+1|) - \frac{8}{x+1} + C$

3) a) n is large and p is close to 0.5 b) 0.1593 c) 0.577 d) 115

4 a) 60**i** - 120**j** b) (20 + 60t)**i** + (35 - 120t)**j**

c) 96t**i** – 72t**j** d) 80 km

5 a) $1 + \frac{7}{2}x + \frac{21}{4}x^2 + \frac{35}{8}x^3$ b) 42

Answers Version P

1) 16.6°, 65.9°

2) $\frac{\ln(|2x-1|)}{3} - \frac{\ln(|x+1|)}{3} - \frac{2}{x+1} + C$

3) a) n is large and p is close to 0.5 b) 0.1485 c) 0.694 d) 113

4 a) 60**i** - 160**j** b) (30 + 60t)**i** + (45 - 160t)**j**

c) 192t**i** – 144t**j** d) 234 km

5 a) $1 + 4x + 7x^2 + 7x^3$ b) 60

Answers Version Q

1) 8.0 °, 115.9°

2) $\frac{7ln(|2x-1|)}{9} - \frac{7ln(|x+1|)}{9} - \frac{4}{3x+3}$ + c

3) a) n is large and p is close to 0.5 b) 0.0851 c) 0.794 d) 110

4 a) 60**i** - 200**j** b) (40 + 60t)**i** + (55 - 200t)**j**

c) 288t**i** – 216t**j** d) 425 km

5 a) $1 + \frac{9}{2}x + 9x^2 + \frac{21}{2}x^3$ b) $\frac{165}{2}$

Answers Version R

1) -285.2°, 194.8°

2) $-4ln(|2x+1|) + 4ln(|x+1|) - \frac{3}{x+1} + C$

3) a) n is large and p is close to 0.5 b) 0.0528 c) 0.982 d) 91

4 a) $2(x_1 - x_0)$**i** + $2(y_1 - y_0)$**j** b) $(x_0 + 2t(x_1 - x_0))\boldsymbol{i} + (y_0 + 2t(y_1 - y_0))\boldsymbol{j}$

c) 48t**i** – 36t**j** d) $\sqrt{(96 - 4x_1 + 3x_0)^2 + (-72 - 4y_1 + 3y_0)^2}$

5 a) $1 + 5x + \frac{45}{4}x^2 + 15x^3$ b) 110