NAMILYANGO COLLEGE

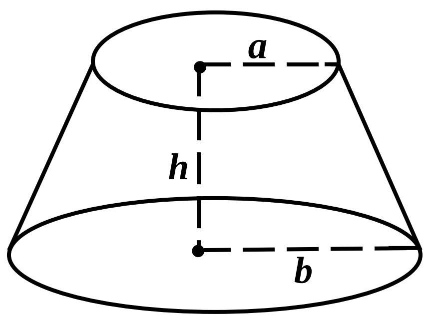
A –LEVEL APPLIED MATHEMATICS SEMINAR 2024

PAPER STRUCTURE	***SECTION A***	***SECION B***
Statistics and probability	***3***	***3***
Numerical methods	***2***	***2***
Static Mechanics	***1***	***1***
Dynamic Mechanics	***1***	***1***
Kinematic Mechanics	***1***	***1***

STATIC MECHANICS

1(a) *Show that the centre of gravity of a solid cone of radius* $\boldsymbol{r}$ *and height* $\boldsymbol{h}$ *lies along its axis at a distance* $\frac{1}{4}h$ *from the base*

(b) *The figure below shows a solid conical frustum of height* $\boldsymbol{h}$ *and whose top and bottom radii being* $\boldsymbol{a}$ *and* $\boldsymbol{b}$ *respectively*



Show that the centre of gravity of this frustum lies along its axis at a distance

$$\frac{h(b^2+2ab+3a^2)}{4(b^2+ab+a^2)}$$ *from the bottom*

2. (a) *A particle of weight* ***50N*** *is supported by two light inextensible strings of lengths* ***8m*** *and* ***13m*** *attached to two fixed points* ***15m*** *apart on a horizontal beam. Find the tension in each string*

(b) *The ends* **P** *and* **Q** *of a light inextensible string* **PBCQ** *are fastened to two fixed points on a horizontal beam***.** *Particles of mass* **3kg** *and* **4kg** *are attached to the string at the points* **B** *and* **C** *respectively***.** *If* **PB** *is inclined at* $45°$ *to the horizontal and* $\angle PBC = 150°$*, find the***:**

(i) *tension in each portion of the string*

(ii) *angle* **CQ** *makes with the horizontal*

3. ABCDE *is a regular pentagon of side* **4m.** *Forces of magnitude* **2N, 3N, 5N** *and* **7N** *act along* $\overrightarrow{AB}$, $\overrightarrow{BC}$, $\overrightarrow{CD}$ *and* $\overrightarrow{EB}$ *respectively***.** *The resultant of this system of forces cuts* **AB** *produced at* **H.** *Taking* **A** *as the origin and* **AB** *as the* **x–axis,**

(i) *find the magnitude and direction of the resultant force*

(ii) *show that length* $AH = 15{\cdot}34m$ *correct to* **4 S·f**

(iii) *find the perpendicular distance from* **A** *to the line of action of the resultant force*

4. *Coplanar forces* $(3i + 3j)N$, $(4i - 5j)N$, $(-5i + 2j)N$ *and* $(2i + 3j)N$ *act at points with position vectors* $(3i + j)m$, $(i + 3j)m$, $(-2i + j)m$ *and* $(-2i - 2j)m$ *respectively***.**

(i) *Find the resultant force and find where its line of action cuts the* **x–axis**

(ii) *A couple of moment* **bNm** *acting anticlockwise and a force* $(pi + qj)N$ *acting at a point with position vector* $(2i + j)m$ *are now added to the above system***.** *If these reduce the system to equilibrium***,** *find the values of* **p, q** *and* **b**

5. *A uniform ladder* **PQ** *of length* **2a** *and weight* **w** *is inclined at an angle of* $\tan^{-1} 2$ *to the horizontal with its end* **Q** *resting against a smooth vertical wall and end* **P** *on a rough horizontal ground with which the coefficient of friction is* $\frac{5}{12}$. *If a boy of weight* **W** *can safely ascend a distance* **x** *up this ladder before it slips,*

(i) *show that* $x = \dfrac{a(2w + 5W)}{3W}$

(ii) *deduce that the boy can only reach the top of the ladder if* **W = 2w**

6. *A uniform rod* **PQ** *of length* **8m** *and weight* **18N** *is freely hinged at* **P** *and carries a mass of* **3kg** *at* **Q.** *The rod is kept horizontally by a string attached at* **Q** *and to a point* **C** *distant* **6m** *vertically above* **P.** *Find the:*

(i) *tension in the string*

(ii) *magnitude and direction of the reaction at the hinge*

7. *A box of mass* **6·5kg** *is placed on a rough plane inclined at* $\tan^{-1}\left(\frac{3}{4}\right)$ *to the horizontal. The coefficient of friction between the box and the plane is* **0·25.** *Find the least horizontal force required:*

(i) *to move the box up the plane*

(ii) *to prevent the box from sliding down the plane*

KINEMATIC MECHANICS

1. *Two cyclists **P** and **Q** are travelling along straight roads which cross at an angle of **60°** at point **C.** If their riding speeds towards **C** are* $4kmh^{-1}$ *and* $5kmh^{-1}$ *and they are respectively **8km** and **15km** from **C,** find the**:***

(i) *least distance between the cyclists*

(ii) *time that elapses before the cyclists are closest*

(iii) *distances of **P** and **Q** from **C** when they are nearest*

2. *A battleship and a patrol ship are initially **16km** apart with the battleship on the bearing of **035°** from the patrol**.** The battleship sails at* $14kmh^{-1}$ *in the direction **S30°E** and the patrol ship at* $17kmh^{-1}$ *in the direction **N50°E.***

(a) *Find the**:***

(i) *shortest distance between the ships*

(ii) *time that elapses before the ships are closest*

(b) *If the guns on the battleship have a range of up to **6km,** find the time that elapses when the patrol ship is within range of these guns*

3.Two boats **P** and **Q** are sailing with respective speeds of* $20kmh^{-1}$ *and* $19kmh^{-1}$**.** *Initially **P** is **10km** from **Q** on a bearing of **320°** and is on a course of **200°.***

*Find the**:***

(i) *two possible courses **Q** can take in order to intercept **P***

(ii) *time taken for interception to occur in each case*

4. (a) *At certain times, the position vector* **r** *and velocity vector* **v** *of two ships* **A** *and* **B** *are as follows:*

$$r_A = (-2i + 3j)km \quad V_A = (12i - 4j)kmh^{-1} \text{ at } 11:45am$$
$$r_B = (8i + 7j)km \quad V_B = (2i - 14j)kmh^{-1} \text{ at } 12:00noon$$

If the ships maintain these velocities, find the:

(i) *position vector of ship* **A** *at noon*

(ii) *time when the ships are closest*

(iii) *shortest distance between the ships*

(iv) *distance of ship* **A** *from the origin when the two ships are closest*

(b) *If instead ship* **B** *had a velocity* $V_B = (-2i - 14j)kmh^{-1}$, *show that the ships will collide and find when and where the collision occurs*

5. *Two stations* **P** *and* **Q** *are* **2·5km** *apart. A train passes* **P** *at a speed of* $14ms^{-1}$ *and accelerates uniformly for* **20s** *to a speed* v_1. *Over the next* **720m** *covered in* **15s,** *its acceleration alters to a speed* v_2. *It travels at this speed for* **13s** *and then over the next* **500m** *covered in* **10s** *with uniform deceleration its speed at* **Q** *is* v_3. *Find the:*

(i) *values of* v_1, v_2 *and* v_3

(ii) *acceleration for the second part of the motion*

(iii) *fraction of the whole distance covered with constant speed*

6. (a) *The velocity of a uniformly accelerating train changes from* $\boldsymbol{u}$ *to* $\boldsymbol{v}$ *in time* $\boldsymbol{t}$.

(i) *Sketch its velocity time graph*

(ii) *Derive the equation for its motion* $v^2 = u^2 + 2as$, *where* $\boldsymbol{a}$ *is its acceleration*

(b) *A uniformly accelerating train passes successive kilometer marks with velocities* $20ms^{-1}$ *and* $28ms^{-1}$ *respectively. Find its velocity when passing the next kilometer mark*

(c) *A uniformly retarding car takes* **8s** *and* **16s** *to travel between successive points* **A, B** *and* **C** *each* **144m** *apart. Find the further distance it travels to come to rest*

7. (a) *A particle is projected from level ground at an angle of elevation* θ *with initial speed* ums^{-1}. *Show that the equation of its path is given by*

$$y = x\tan\theta - \frac{gx^2(1+\tan^2\theta)}{2u^2}$$

(b) *A ball kicked from level ground with a speed of* $30ms^{-1}$ *just clears a vertical wall* **9m** *high and* **72m** *away. Calculate the possible angles of projection* (*use* $g = 10ms^{-2}$)

(c) *A ball projected at an angle with a speed of* $14\sqrt{10}ms^{-1}$ *from the top of a tower* **200m** *high hits the ground at a point* **200m** *away from the foot of the tower.*

(i) *Show that the two possible directions of projection are at right angles to each other*

(ii) *Find the two possible times of flight*

8. *A particle is projected from the origin* **O** *with velocity* $\boldsymbol{u} = (9\cdot 8\boldsymbol{i} + 29\cdot 4\boldsymbol{j})ms^{-1}$ *and moves freely under gravity.*

(a) *Find the particle's velocity and position vector after* **t** *seconds*

(b) *Show that the particle's equation of path is given by* $y = 3x - \frac{5x^2}{98}$.

Hence find the particle's horizontal range and maximum height reached

(c) *Find the direction in which the particle is moving after* **t** *seconds*

(d) *Find the two times when the direction in which the particle is moving is at right angles with the line joining the position of the particle to* **O**

DYNAMIC MECHANICS

1. *A force* $(24t\boldsymbol{i} - 12\boldsymbol{j})N$ *acts on a particle of mass* **2kg** *initially at rest at a point with position vector* $(-4\boldsymbol{i} + 3\boldsymbol{j})m$. *Find the:*

(i) *velocity of the particle after* **t** *seconds*

(ii) *distance from the origin after* **2s**

(iii) *power exerted by the force at* $t = 2s$

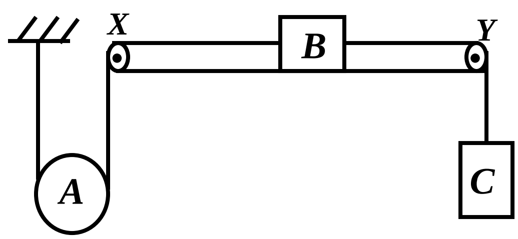
(iv) *work done by the force between* $t = 1s$ *and* $t = 2s$

2. *A pile–driver of mass* $m_1 kg$ *falls through a height* **hm** *onto a pile of mass* $m_2 kg$ *without rebounding. If the pile is driven into the ground a depth* **d m,** *show that the resistance of the ground to penetration* $R = \frac{m_1^2 gh}{(m_1 + m_2)d} + (m_1 + m_2)g$ *and the time for which the pile is in motion* $T = \frac{(m_1 + m_2)d\sqrt{2gh}}{m_1 gh}$

3. (a) *A car of mass* **500kg** *is moving up a hill inclined at* $\sin^{-1}\left(\frac{1}{7}\right)$ *to the horizontal. The resistance to motion of the car is* **300N.** *If the power output of the car is* **84kW,** *find the acceleration of the car when its speed is* $35ms^{-1}$

(b) *A car of mass* **800kg** *is moving at a constant speed of* $20ms^{-1}$ *down a hill inclined at an angle* θ *to the horizontal. The resistance to motion of the car is* **1300N.** *If the power output of the car is* **10kW,** *show that* $\sin\theta = \frac{5}{49}$

4. *A light inelastic string is fixed at one end and passes under a moveable pulley* **A** *of mass* **4kg** *which hangs vertically. The other end of the string is attached to particle* **B** *of mass* **4kg** *which lies on a rough horizontal table. A second inelastic string connects* **B** *to a freely hanging particle* **C** *of mass* **10kg.** *The strings are passing over smooth fixed pulleys* **X** *and* **Y** *as shown*



If the system is released from rest and the coefficient of friction between **Q** *and the table is* **0·5,** *find the:*

(i) *accelerations of* **A, B** *and* **C**

(ii) *tension in the strings*

(iii) *reaction of pulley* **Y** *on the string*

5. *A particle moving with S·H·M has velocities of* $7\cdot 5ms^{-1}$ *and* $4ms^{-1}$ *as it passes through points* **P** *and* **Q** *which are* **0·9m** *and* **0·2m** *respectively from the end points of its path. Find the:*

(i) *length of its path and the period of the motion*

(ii) *maximum velocity and maximum acceleration*

(iii) *time it takes to travel directly from* **P** *to* **Q**

(iv) *time which elapses before it next passes through* **Q**

(v) *mean velocity during its motion from one extreme position to the other*

6. *A particle of mass* **m** *is suspended from a fixed point* **O** *by a light elastic string of natural length* **l***. When the particle hangs in equilibrium, the extension of the string is* **d.** *The particle is then slightly vertically displaced from its equilibrium position and then released. Show that it moves with SHM of period* $2\pi\sqrt{\frac{d}{g}}$

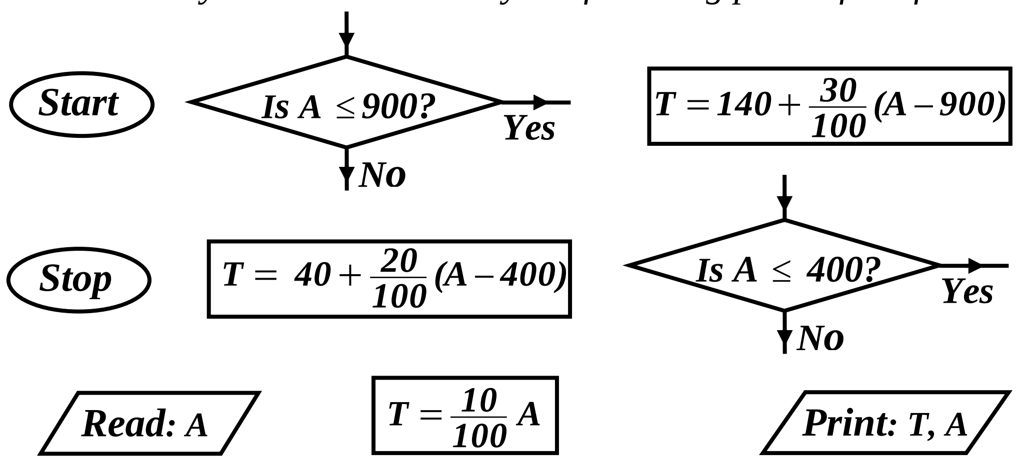
NUMERICAL METHODS

1. *Three decimal numbers* **X, Y** *and* **Z** *were rounded off to give* **x, y** *and* **z** *with errors* Δx, Δy *and* Δz *respectively. Show that the maximum relative error in the approximation of* $\frac{X}{Y-Z}$ *by* $\frac{x}{y-z}$ *is* $\left|\frac{\Delta x}{x}\right| + \left|\frac{\Delta y}{y-z}\right| + \left|\frac{\Delta z}{y-z}\right|$*. Hence find the absolute error and percentage error in* $\frac{1\cdot 6}{2\cdot 15 - 1\cdot 9}$ *and the interval within which its exact value is expected to lie*

2. *The income tax of an employee is calculated as follows:*

Taxable Income, A (£)	***Tax rate (%)***
01 – 400	***10***
401 – 900	***20***
Above 900	***30***

The taxation system is described by the following parts of the flowchart:



(i) *Arrange the given parts to form a complete logical flowchart*

(ii) *State the purpose of the flowchart*

(iii) *Performing a dry run for the flow chart and complete the table below*

A	***T***
1500	- - - -
750	- - - -

3. (i) *Show that the Newton Raphson formula for finding the natural logarithm of the* k^{th} *root of a number* **A** *is given by* $x_{n+1} = x_n - \frac{1}{k} + \frac{A}{k}e^{-kx_n}$

(ii) *Draw a flowchart that computes and prints the root in* **(a)** *above correct to* **3** *decimal places*

(iii) *Perform a dry run for your flowchart using* $x_o = 1 \cdot 25$, $A = 147$ *and* $k = 4$

4. *Find the percentage error in estimating* $\int_0^{\frac{\pi}{3}} \sec^2 x \, dx$ *using trapezium rule with six ordinates correct to* **4** *decimal places and state how it can be reduced*

5. *An equation has two iterative formulae* $x_{n+1} = 2x_n^2 e^{x_n}$ *and* $x_{n+1} = \frac{1}{2} e^{-x_n}$.

(i) *Use each formula twice to deduce with a reason the most suitable one when* $x_o = 0 \cdot 4$. *Hence state the root correct to* **3** *d.p*

(ii) *Without iterating deduce with a reason the most suitable formula when* $x_o = 0 \cdot 4$. *Hence use it twice to find the root correct to* **3** *d.p.*

(iii) *Show that the equation for the two iterative formulae is* $2xe^x - 1 = 0$

6.(a) *Show that the equation* $\cos(x^2) - x + 3 = 0$ *has a root between* **2.5** *and* **3.** *Hence use linear interpolation thrice to find the root correct to* **3** *d.p*

(b) *In a motor rally, car* **P** *was observed to be at distances of* **350m** *and* **400m** *from the starting line when the chasing car* **Q** *was at distances of* **240m** *and* **300m** *respectively. How far was car* **P** *from the starting line when car* **Q:**

(i) *started chasing it*

(ii) *caught up with it*

(c) *Use the fact that* $f(1.15) = 1.32$ *and* $f^{-1}(1 \cdot 26) = 1 \cdot 25$ *to find the value of* $f^{-1}(1 \cdot 22)$ *by linear interpolation correct to* **3 d.p**

7. *Locate the ranges where the two real roots of the equation* $x^4 - x - 10 = 0$ *lie. Hence use Newton Raphson method to find the least root correct to **3** d·p*

STATISTICS

1. *The table below shows the prices of three items for the years **2023** and **2024***

Item	***PRICE (£)***		***Weights***
	IN 2023	***IN 2024***	
A	***150***	***153***	***5***
B	***250***	***261***	***2***
C	***525***	***588***	***3***

*Taking **2023** as the base year, calculate the:*

(i) *simple aggregate price index for **2024.** Comment on your result*

(ii) *weighted mean price index for **2024.** Comment on your result*

(iii) *weighted aggregate price index for **2024.** Comment on your result*

(iv) *cost of items in **2023,** similar to the items in **2024** whose cost was **£540** using the result in **(iii)** above*

2. *The grades of **8** students in **UNEB, pre mock** and **post mock** were as follows:*

UNEB	***B***	***A***	***O***	***C***	***B***	***E***	***O***	***D***
Pre Mock	***D***	***B***	***D***	***C***	***A***	***F***	***O***	***E***
Post Mock	***C***	***B***	***E***	***O***	***A***	***D***	***F***	***E***

(a) *Calculate the rank correlation coefficient between the grades of:*

(i) UNEB *and* ***Pre Mock***

(ii) UNEB *and* ***Post Mock***

(b) *Which of the two mocks had a better correlation with **UNEB?** Give a reason*

3. *The table below shows the weights in kg of* **100** *babies***:**

Weights	***2***	***2·5***	***4·5***	***6***	***7***	***8***
No of babies	***35***	***20***	***20***	***10***	***10***	***5***

(i) *Calculate the mean, variance and median for the above data*

(ii) *Assuming this was a sample taken from a normal population***,** *find the* **90%** *confidence interval for the mean weight of all babies*

4. *The table below shows the weights in kg of* **40** *boys***:**

Weights	***30 −< 35***	***35 −< 40***	***40 −< 55***	***55 −< 60***	***60 −< 65***
Frequency	***8***	***5***	***12***	***9***	***6***

(a) *Calculate the mean, mode and percentage of boys heavier than* **45 kg**

(b) *Draw an ogive for the data and use it to estimate the***:**

(i) *median weight*

(ii) *quartile deviation*

(iii) *range of the weights of the middle* **70%** *of the boys*

(c) *Draw a histogram for the data and use it to estimate the modal weight*

5. *The price index of an item in* **2022** *based on* **2023** *was* **88.** *Its price index in* **2024** *based on* **2023** *was* **132.** *Find its***:**

(i) *price index in* **2024** *based on* **2022**

(ii) *price in* **2022** *if its price in* **2024** *was* **£600**

PROBABILITY

1. *A box contains **150** red and **50** blue pens. **48** pens are drawn in succession at random from the box with replacement. Find the probability of picking:*

(i) *exactly **30** red pens*

(ii) *at least **29** red pens*

(iii) *at least **8** but less than **20** blue pens*

2. *A continuous* $r{\cdot}v\ X \sim R(3, 15)$.

(a) *Write down the p·d·f of **X** and sketch it*

(b) *Find:* ***(i)*** $E(X)$ ***(ii)*** $Var(X)$ ***(iii)*** *the upper quartile of **X***

(iv) $P(4 < X < 10)$ ***(v)*** $P(|X - 7| < 2 / X \geq 6)$

(vi) *the distribution function of **X** and sketch it*

3. *Box **A** contains **4** red and **3** green pens, box **B** contains **3** red and **4** green pens, while box **C** contains **5** red and **2** green pens. Boxes **A, B** and **C** are in the ratio **2 : 3 : 5** respectively as likely to be picked. If a box is selected at random and two pens are picked from it without replacement,*

(a) *find the probability of picking:*

(i) *pens of different colours*

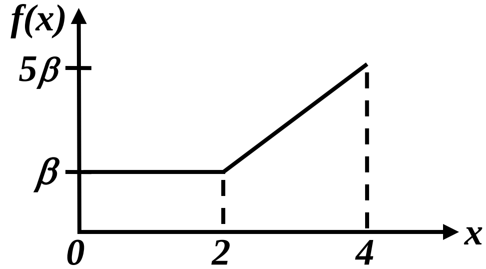
(ii) *box **B** given that the pens drawn are of the same colour*

(b) *If **X** is the number of red pens drawn, find the:*

(i) *probability distribution of **X***

(ii) *median, mean and variance of **X***

4. *The p·d·f of a continuous* **r·v X** *is distributed as follows:*



Find:

(i) *the value of* $\boldsymbol{\beta}$

(ii) *the equations of the p·d·f*

(iii) *the mean and median of* **X**

(iv) *the cumulative distribution function of* **X** *and sketch it*

(v) $P(X > 1 / X < 3)$

5. *A continuous r·v* **X** *has the following distribution function:*

$$F(x) = \begin{cases} 0 & , \quad x \le 0 \\ \frac{\sqrt{2}}{2}\sin x & , \quad 0 \le x \le \lambda \\ 1 - \frac{\sqrt{2}}{2}\cos x & , \quad \lambda \le x \le \frac{\pi}{2} \\ 1 & , \quad x \ge \frac{\pi}{2} \end{cases}$$

(a) *Show that* $\lambda = \frac{\pi}{4}$

(b) *Find:*

(i) $P\left(\left|X - \frac{\pi}{4}\right| \le \frac{\pi}{12}\right)$

(ii) *the equations of the p·d·f and sketch it, hence deduce the mean of* **X**

(iii) $E\left(3X - \frac{\pi}{3}\right)$

6. *A discrete* $\boldsymbol{r \cdot v}$ $\boldsymbol{X}$ *has the following* $p{\cdot}d{\cdot}f$**:**

$$P(X = x) = \begin{cases} \frac{1}{60}(ax + b) & , \quad x = 1, 2, 3, 4 \\ 0 & , \quad \textit{otherwise} \end{cases}$$

Given that $F(3) = \frac{13}{20}$, *find the:*

(i) *values of* $\boldsymbol{a}$ *and* $\boldsymbol{b}$, *hence sketch the* $p{\cdot}d{\cdot}f$ *of* $\boldsymbol{X}$

(ii) $P(X > 1 / X < 3)$

(iii) *mean and variance of* $\boldsymbol{X}$

(iv) $E(3X - 4)$ *and* $Var(3X - 4)$

7. (a) *A random variable* $\boldsymbol{X}$ *is binomially distributed with mean* $\boldsymbol{4{\cdot}8}$ *and variance* $\boldsymbol{2{\cdot}88}$. *Find* $P(X < 6)$

(b) *A student answers* **12** *questions. The chance of passing each question is* $\frac{1}{3}$.

Find the probability of passing:

(i) *exactly* **7** *questions*

(ii) *at least* **2** *questions*

8. *A random variable* $\boldsymbol{X}$ *is normally distributed such that* $P(X < 76) = 0{\cdot}9772$ *and* $P(72 < X < 76) = 0{\cdot}044$. *Find:*

(i) *the mean and standard deviation of* $\boldsymbol{X}$

(ii) $P(X > 45)$

(iii) *the interval which contains the middle* **95%** *of distribution*

9. *A random sample of* **100** *nails taken from a normal population had the following lengths* x *in cm*: $\sum x = 380$ *and* $\sum x^2 = 1840$. *Find the*:

(i) *unbiased estimate for the population variance*

(ii) 90·8% *confidence interval for the population mean*

10. *A random sample of* **36** *items drawn from a normal population is such that the* **95%** *confidence interval for the mean of all the items is* **[67·9, 77·7]**. *Find the* **90%** *confidence limits for the mean of all the items*

11. *Given that* $P(A \cup B) = \frac{9}{10}$, $P(A/B) = \frac{1}{3}$ *and* $P(B/A) = \frac{2}{5}$, *find*:

(i) $P(A)$

(ii) $P(\overline{A}/\overline{B})$

(iii) ***P(A** or **B** but not both **A** and **B)***

12. *At a certain party*, **25%** *of the guests are women. Nile beer and Bell beer are the only drinks available for the guests.* **40%** *of the women and* **70%** *of the men take Nile beer. Of the men taking Nile beer*, **80%** *got drunk and of the men taking Bell beer*, **60%** *got drunk. Of the women taking Nile beer*, **50%** *got drunk and of the women taking Bell beer*, **40%** *got drunk. Find the probability that a randomly selected guest*:

(i) *takes Nile beer*

(ii) *got drunk*

(iii) *got drunk given that is a woman*

(iv) *is a man given that he got drunk for taking Nile beer*

13. ***(a)*** *Events* **A** *and* **B** *are such that* $P(A)=\frac{2}{3}$, $P(B)=\frac{1}{4}$ *and* $P(A\cup B)=\frac{17}{24}$.

Find: ***(i)*** $P(A\cap B)$ ***(ii)*** $P(\overline{A}\cap B)$ ***(iii)*** $P(\overline{A}\cap\overline{B})$ ***(iv)*** $P(\overline{A}\cup\overline{B})$

(b) *If* $\overline{A}$ *and* $\overline{B}$ *are independent events,*

(i) *Show that the events* **A** *and* **B** *are also independent*

(ii) *find* $P(B)$ *and* $P(\overline{A}\cup\overline{B})$, *if* $P(A)=0\cdot 375$ *and* $P(A\cup B)=0\cdot 75$

(c) *Find the possible values of* $P(A)$, *if* **A** *and* **B** *are independent events such that* $P(A\cap B)=0\cdot 3$ *and* $P(A\cup B)=0\cdot 875$

14. *A task in mathematics is given to three students whose chances of solving it are* $\frac{1}{3}$, $\frac{1}{4}$ *and* $\frac{1}{5}$ *respectively. Find the probability that:* ***(i)*** *the task is solved* ***(ii)*** *only one student solves it* ***(iii)*** *at least two of them solved it*

15. *Two soldiers* **A** *and* **B** *in that order take turns shooting a bullet at a target. The first one to hit the target wins the game. If their chances of hitting the target on each occasion they shoot are* $\frac{1}{3}$ *and* $\frac{1}{4}$ *respectively, find the chance that:*

(i) **A** *wins the game on his third shot* ***(ii)*** **A** *wins the game.*

16. *Mutually exclusive events* **A** *and* **B** *are such that* $P(A\cup B)=0\cdot 75$ *and* $P(A)=0\cdot 27$, *find:* ***(i)*** $P(\overline{A}\cup B)$ ***(ii)*** $P(\overline{A}\cap\overline{B})$ ***(iii)*** $P(A\cap B)'$

17. *Exhaustive events* **A** *and* **B** *are such that* $5P(A)=4P(B)$ *and* $P(A\cap B)=\frac{1}{5}$.

Find: ***(i)*** $P(A)$ ***(ii)*** $P(A/B)$ ***END***