SMK CONVENT BUKIT NANAS, KL (2005)
MATHEMATICS T (PAPER 1)

1. By using the laws of set algebra, show that, for any sets A and B,

$$A \cap (A \cap B)' = A \cap B'.$$ [4]

2. Solve the inequality $\left|\frac{x-5}{x}\right| < 3$. [5]

3. If $w = \frac{\sqrt{3}+i}{1+i\sqrt{3}}$, express w in the form $x + yi$. Find the modulus and argument of w. [4]

4. The sum of the first two terms of a geometric series is $\frac{4}{3}$, while the sum of the next two terms is 12.

   (a) Find the first term and common ratio, r, of this geometric series. [4]

   (b) Given that $r > 0$, find the sum from the 4th term to the 10th term of the series. [2]

5. Show graphically that the equation $\ln x = 2 - x$ has only one real root, and prove that this root lies between 1.5 and 2.

   Use the Newton-Raphson method with the initial estimate, $x = 1.5$ to estimate this root correct to two decimal places. [7]

6. Express $\frac{2x-1}{(x^2+1)(x+2)}$ in partial fractions.

   Hence, find $\int \frac{2x-1}{(x^2+1)(x+2)}\,dx$. [6]

7. Given two points A and B with coordinates $(3, 6)$ and $(5, 8)$ respectively. Find the equation of a line that passes through A and perpendicular to AB.

   Find an expression for the shortest distance from $P(\alpha,\beta)$ to the line AB in terms of α and β. If this distance is half of the distance P from B, find the locus of P. [8]

LEE HOCK LEONG
M.Sc. (Pure Maths) – CGPA 4
B.Sc with Ed. (1st Class Hons.)

8. (a) If the matrix $\begin{pmatrix} 2 & k+3 & 1 \\ 2k & 4 & -3 \\ 2 & 5 & 1 \end{pmatrix}$ is singular, find the possible values of k. [4]

   (b) Show that the matrix $A = \begin{pmatrix} 0 & -3 \\ -1 & 1 \end{pmatrix}$ satisfies the equation $A^2 - A - 3I = 0$.

   Hence, without evaluating A^3 or A^4, show that $A^4 = 7A + 12I$. [5]

9. Expand $\sqrt[3]{1+3x}$ in ascending powers of x up to the term in x^5.

   Find the range of values of x for which the expansion is valid.

   By taking $x = -\frac{1}{8}$, find $\sqrt[3]{5}$ correct to three decimal places.]10]

10. Sketch on the same coordinate axes, the curves of $xy = 2$ and $x^2 = y - 1$.

    Find the coordinates of the point of intersection between the two curves.

    Show that the area of the region bounded by the two curves and the line $x = 3$, is $\frac{32}{3} - 2\ln 3$.

    Find the volume of the solid formed when the region is rotated through 2π radians about the x–axis. [12]

11. Two points $P(ap^2, 2ap)$ and $Q(aq^2, 2aq)$ on the parabola $y^2 = 4ax$ are such that the line PQ passes through a fixed point $(a, 0)$.

    (a) Find the equation of the chord PQ and show that $pq = -1$. [6]

    (b) From the equation of PQ, deduce the equation of the tangents at P and Q.

    Show that the point of intersection of the tangents lies on a fixed line. Give the equation of the fixed line. [7]

12. Find the equation of the asymptotes and the axis of symmetry of the curve $y = \frac{x^2-4}{x^2+4}$. [4]

    Find the coordinates of the turning point of the curve. Hence, sketch the curve. [9]

    Determine the set of values of k such that the equation

    $x^2 + 4 = k(x^2 - 4)$ has real roots. [2]

MATHEMATICS T (PAPER 2)

1. Show that $\dfrac{2\sin x + \sin 2x}{1-\cos 2x} = \dfrac{\sin x}{1-\cos x}$. [5]

2. Find all values of x, where $0^\circ < x < 360^\circ$, which satisfy the equation
$\tan^2 x = 5 - \sec x$. [5]

3. (a) In Figure 1, $\angle ACO = \angle ECO$ and $\angle BOC = \angle DOC$, show that $AB = ED$. [5]

   (b) In Figure 2, AC cuts BD at N. If AB is parallel to DC, show that $NC = ND$ and $\angle AND = 2\,\angle ABD$. [5]

Figure 1

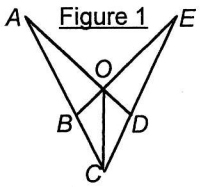
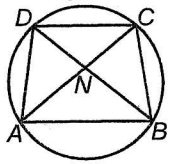


Figure 2



4. The position vectors of the points A, B and C are $2a\underline{i}$, $-a\underline{i}$ and $-a\underline{i} + a\underline{j}$ respectively, where $a > 0$. Evaluate $\overrightarrow{AC} \bullet \overrightarrow{BC}$ and find the value of $\angle ACB$. [7]

5. At noon, a destroyer received information that an enemy vessel is 10 km away in the direction of 036°, and is proceeding on a course of 140° at 16 kmh^{-1}. If the destroyer steers on a course of 069° at 21 kmh^{-1}, find the time when the destroyer is nearest to the enemy vessel and find their shortest distance apart. [11]

6. The surface area of a pool is 5000 m^2 and algae cover part of it. At any instant, the area of algae is increasing at a rate, which is directly proportional to its area at that instant. Obtain a differential equation that connects the area of algae x m^2 with the time t days.
Given that when $t = 0$, $x = 100$ and when $t = 5$, $x = 500$. Show that $\ln\frac{x}{100} = \frac{t}{5}\ln 5$.
By giving your answer correct to 3 significant figures, find
   (a) the area of the pond not cover by the algae when $t = 7.5$ days,
   (b) the value of t when the algae covers 40% of the surface of the pond. [11]

7. A discrete random variable X has the following cumulative distribution function,

$$F(x) = \begin{cases} 0 & , x < 1 \\ 0.42 & , 1 \le x < 2 \\ 0.67 & , 2 \le x < 3 \\ 0.80 & , 3 \le x < 4 \\ 1 & , 4 \le x \end{cases}$$

Construct the probability distribution of X and evaluate $P(X > 2)$. [5]

LEE HOCK LEONG
M.Sc. (Pure Maths) – CGPA 4
B.Sc with Ed. (1st Class Hons.)

8. The number of emergency admissions each day to a hospital is found to follows a Poisson distribution with mean 1.8.
   (a) Find the probability that on a particular day there will be no emergency admission.
   (b) At the beginning of a day, the hospital has 4 beds available for emergencies. Find the probability that this will be insufficient for that day. [5]

9. From past experience, the probability that a new worker in a company can complete his daily tasks satisfactorily is 0.85 if he has undergone the company's in-house training, and 0.4 if he has not undergone the training. If 90% of the new workers undergone the training, find the probability that a new worker of the company
   (a) can complete his tasks satisfactorily,
   (b) has not undergone training, given that he is able to complete his tasks satisfactorily. [5]

10. The marks for a test are normally distributed with a mean of 62 and standard deviation of 12.
   (a) Find the percentage of students that could be expected to receive a distinction (ie. 85 marks and above).
   (b) If 40 students are chosen at random, find the number of failures (less than 50 marks).
   (c) It is desired to change the distinction mark so that the top 5% receive a distinction. Find the lowest mark for the new distinction. [8]

11. The continuous random variable X has the probability density function

$$f(x) = \begin{cases} ax^2 + bx + 1 & , 0 \le x \le 1 \\ 0 & , \text{otherwise} \end{cases}$$, where a and b are constants.

   (a) Given that $E(X) = \frac{2}{3}$, find the values of a and b. [6]
   (b) Find the variance of X. [4]
   (c) Sketch the graph of $f(x)$. [2]
   (d) Find $P(\frac{1}{3} < X < \frac{2}{3})$. [3]

12. The following data show the scores obtained in a test by a group of students,

30	72	41	93	54	32	66	48	48	100	61
52	82	52	84	71	43	46	73	52	57	65

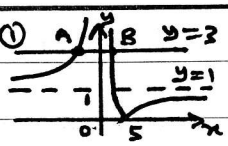
   (a) Display the data in an ordered stemplot. [2]
   (b) Find the mean and standard deviation. [4]
   (c) Find the median and inter-quartile range. [4]
   (d) Draw a boxplot to represents the data. [3]

1. $A\cap(A\cap B)' = A\cap(A'\cup B')$

$=(A\cap A')\cup(A\cap B') = \phi\cup(A\cap B')$

$= A\cap B'$ ✱

2. $\left|\frac{x-5}{x}\right|<3 \Rightarrow \left|1-\frac{5}{x}\right|<3$ — ①



For A, B: $1-\frac{5}{x}=\pm 3$

$\therefore x=-\frac{5}{2}$ or $\frac{5}{4}$

$\therefore$ For ①: $\{x: x<-\frac{5}{2}$ or $\frac{5}{4}<x\}$ ✱

3. $w=\frac{\sqrt{3}+i}{1+i\sqrt{3}}\cdot\frac{1-i\sqrt{3}}{1-i\sqrt{3}} = \frac{\sqrt{3}}{2}-\frac{1}{2}i$ ✱

$|w| = \frac{1}{2}[3+1]^{1/2} = 1$ ✱

$\arg(w) = \tan^{-1}\left(\frac{-1}{\sqrt{3}}\right) = \frac{5\pi}{6}$ ✱

4. $a+ar=\frac{4}{3}$ — ① $\quad ar^2+ar^3=12$ — ②

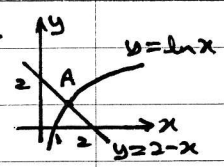
(a) $\frac{②}{①}$: $r^2=9 \Rightarrow r=\pm 3$

$r=3$: $a=\frac{1}{3}$ ✱, $r=-3$: $a=-\frac{2}{3}$ ✱

(b) $r>0$: $(r=3)$

$T_4+T_5+\dots+T_{10} = \frac{\frac{1}{3}(3)^3(1-3^7)}{1-3} = 9837$ ✱

5.



only 1 intersection point between $y=\ln x$ and $y=2-x$ $\Rightarrow \ln x = 2-x$ has only 1 real root. ✱

Let $f(x)=\ln x+x-2$

$f(1.5)\cdot f(2) = (-0.095)(0.693)\ (<0)$

$\therefore 1.5<\text{root}<2$ ✱

$f'(x)=\frac{1}{x}+1$: (By NRM) $x_{n+1}=x_n-\frac{f(x_n)}{f'(x_n)}$

$x_0=1.5$: $x_1=1.5-\frac{(-0.0945)}{1.6667}$

$=1.557 \approx 1.56$

$x_2=1.557-\frac{(-0.00024)}{1.6423}=1.557\simeq 1.56$

$\therefore$ root $=1.56$ (2 dp) ✱

6. $f(x)=\frac{2x-1}{(x^2+1)(x+2)} \equiv \frac{Ax+B}{x^2+1}+\frac{C}{x+2}$

$\equiv \frac{(Ax+B)(x+2)+C(x^2+1)}{(x^2+1)(x+2)}$

$\therefore 2x-1 \equiv (Ax+B)(x+2)+C(x^2+1)$

$x=-2$: $-5=C(5) \Rightarrow C=-1$

$[x^2]$: $0=A+C \Rightarrow A=1$

$[x^0]$: $-1=2B+C \Rightarrow B=0$

$\therefore f(x)=\frac{x}{x^2+1}-\frac{1}{x+2}$ ✱

$\therefore \int f(x)\,dx = \frac{1}{2}\ln(x^2+1)-\ln(x+2)+c$

$=\frac{1}{2}\ln\left[\frac{x^2+1}{(x+2)^2}\right]+c$ ✱

7. Eq: $\frac{y-6}{x-3}=-\left(\frac{3-5}{6-8}\right) \Rightarrow y+x=9$ ✱

$d(P)=\frac{\alpha-\beta+3}{\sqrt{1+1}}=\frac{1}{\sqrt{2}}(\alpha-\beta+3)$ ✱

$d(P)=\frac{1}{2}PB$: $\frac{1}{2}(x-y+3)^2=\frac{1}{4}[(x-5)^2+(y-8)^2]$

$2(x^2+y^2+9-2xy+6x-6y) = x^2-10x+25+y^2-16y+64$

$\therefore x^2+y^2-4xy+22x+4y=71$ (locus of P) ✱

8. (a) $\begin{vmatrix} 2 & k+2 & 1 \\ 2k & 4 & -3 \\ 2 & 5 & 1 \end{vmatrix}=0$:

$\therefore 2(4+15)-(k+2)(2k+6)+(10k-8)=0$

$\therefore k^2+k-6=0 \Rightarrow (k+3)(k-2)=0$

$\therefore k=-3$ or 2 ✱

(b) $A^2-A-3I = \begin{pmatrix}3&-2\\-1&4\end{pmatrix}-\begin{pmatrix}0&-2\\-1&1\end{pmatrix}-3\begin{pmatrix}1&0\\0&1\end{pmatrix}=\begin{pmatrix}0&0\\0&0\end{pmatrix}$

$\therefore$ A satisfies $A^2-A-3I=0$ ✱

$A^2=A+3I$: $A^4=(A+3I)(A+3I)$

$\therefore A^4=A^2+3A+3A+9I=(A+3I)+6A+9I$

$\therefore A^4=7A+12I$ ✱

9. $(1+3x)^{1/3}=1+\frac{1}{3}(3x)+\frac{1}{2!}\left(\frac{1}{3}\right)\left(-\frac{2}{3}\right)(3x)^2+$

$\frac{1}{3!}\left(\frac{1}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{5}{3}\right)(3x)^3+\frac{1}{4!}\left(\frac{1}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{5}{3}\right)\left(-\frac{8}{3}\right)(3x)^4$

$+\frac{1}{5!}\left(\frac{1}{3}\right)\left(-\frac{2}{3}\right)\left(-\frac{5}{3}\right)\left(-\frac{8}{3}\right)\left(-\frac{11}{3}\right)(3x)^5+\dots$

$=1+x-x^2+\frac{5}{3}x^3-\frac{10}{3}x^4+\frac{22}{3}x^5+\dots$ ✱

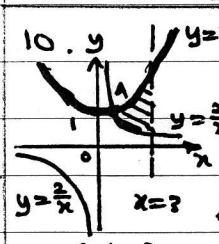
For VE: $|3x|<1 \Rightarrow \{x: -\frac{1}{3}<x<\frac{1}{3}\}$ ✱

$f\left(-\frac{1}{8}\right)=\sqrt[3]{\frac{5}{8}}=\frac{1}{2}\sqrt[3]{5}$

$\therefore \sqrt[3]{5}=2\left(1+\left(-\frac{1}{8}\right)-\left(\frac{1}{8}\right)^2+\frac{5}{3}\left(-\frac{1}{8}\right)^3-\frac{10}{3}\left(-\frac{1}{8}\right)^4\right.$

$\left.+\frac{22}{3}\left(-\frac{1}{8}\right)^5+\dots\right)=1.710$ (3 dp) ✱

10.



For A: $x^2+1=\frac{2}{x}$

$\therefore x^3+x-2=0=(x-1)(x^2+x+2)$

$\therefore x_A=1 \Rightarrow A(1,2)$ ✱

Area $=\int_1^3\left[x^2+1-\frac{2}{x}\right]dx$

$=\left[\frac{1}{3}x^3+x-2\ln x\right]_1^3$

$=\frac{1}{3}[27-1]+(3-1)-2\ln 3 = \frac{32}{3}-2\ln 3$ ✱

$V_x=\pi\int_1^3\left[(x^2+1)^2-\frac{4}{x^2}\right]dx$

$=\pi\left[\frac{1}{5}x^5+\frac{2}{3}x^3+x+\frac{4}{x}\right]_1^3$

$=\pi\left[\frac{1}{5}(243-1)+\frac{2}{3}(27-1)+(3-1)+\left(\frac{4}{3}-4\right)\right]$

$=\frac{976}{15}\pi$ ✱

LEE HOCK LEONG
M.Sc. (Pure Maths) – CGPA 4
B.Sc with Ed. (1st Class Hons.)

11.(a) $m_{PQ} = \frac{2ap-2aq}{ap^2-aq^2} = \frac{2}{p+q}$

$\therefore PQ: \; y-2ap = \frac{2}{p+q}(x-ap^2)$

$\therefore (p+q)y = 2(x+apq)$ #

$A(a,0): \; 0 = 2(a+apq) \Rightarrow pq = -1 \; (a \neq 0)$ #

(b) For tangent P: $\lim_{Q\to P} \equiv \lim_{q\to p}(PQ)$

$\therefore \; 2py = 2(x+ap^2) \Rightarrow py = x+ap^2$ #

$\therefore$ tangent Q: $qy = x+aq^2$

$\therefore (p-q)y = a(p^2-q^2) \Rightarrow y = a(p+q)$

$\therefore qa(p+q) = x+aq^2 \Rightarrow x = apq = -a$

$\therefore (-a, a(p+q))$ lies on $x=-a$ (fixed line) #

12.(a) $y = \frac{x^2+4}{x^2-4} = 1+\frac{8}{x^2-4} = f(x)$

$f(-a) = f(a)$: f is an even function.

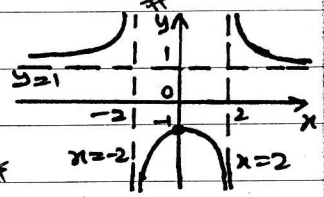
axis of symmetry : $x=0$ (y axis) #

asymptotes : $y=1$, $x=\pm 2$ #

(b) $y' = \frac{8(-1)(2x)}{(x^2-4)^2}$

For $y'=0$: $x=0$

$\therefore$ turning point: $(0,-1)$ #



(c) For $x^2+4 = k(x^2-4)$ to have real roots

$\Rightarrow y = f(x)$ intersects $y=k$

$\therefore \{k : k \leq -1 \text{ or } 1 < k\}$ #

1. $\frac{2\sin x + \sin 2x}{1-\cos 2x} = \frac{2s+2sc}{2s^2}$

$= \frac{1+c}{s}\cdot\frac{s}{s} = \frac{s(1+c)}{1-c^2} = \frac{\sin x}{1-\cos x}$ #

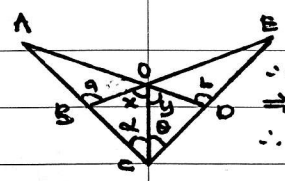
2. $\tan^2 x = 5-\sec x = \sec^2 x - 1$

$\therefore \sec^2 x + \sec x - 6 = 0 = (\sec x - 2)(\sec x + 3)$

$\therefore \cos x = \frac{1}{2}$ or $-\frac{1}{3}$

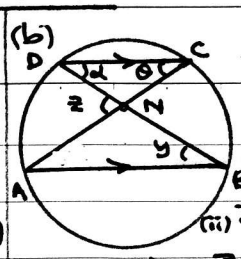
$\therefore x = 60°, 300°, 109.5°$ or $250.5°$ #

3.(a)



Statements	Reasons
$x=y$	given
$\alpha=\theta$	given
$OC=OC$	Common side
$\therefore \Delta COB \equiv \Delta COD$ (By ASA)	
$\Rightarrow OB=OD$ and $\angle CBO = \angle CDO$	
$\therefore a = 180° - \angle CBO = 180° - \angle CDO = b$	
$\angle BOA = \angle DOE$ (opposite angles)	
$\therefore \Delta AOB \equiv \Delta EOD$ (by ASA)	
$\Rightarrow AB = ED$ #	

(b)



Statements	Reasons
(i) $y=\alpha$	Alternate angles
$y=\theta$	Angles in the same segment.
$\therefore \alpha=\theta$	
$\therefore NC=ND$ #	ΔNCD is isosceles
(ii) $z=\alpha+\theta$	exterior angle of Δ
$\therefore z=2y$	
$\Rightarrow \angle AND = 2\angle ABD$ #	

4.(a) $\overrightarrow{AC}\cdot\overrightarrow{BC} = \left[\begin{pmatrix}-a\\a\end{pmatrix}-\begin{pmatrix}0\\2a\end{pmatrix}\right]\cdot\left[\begin{pmatrix}-a\\a\end{pmatrix}-\begin{pmatrix}0\\-a\end{pmatrix}\right]$

$= \begin{pmatrix}-a\\-a\end{pmatrix}\cdot\begin{pmatrix}-a\\2a\end{pmatrix} = a^2-2a^2 = -a^2$ #

(b) $\angle ACB = \cos^{-1}\left[\frac{\overrightarrow{AC}\cdot\overrightarrow{BC}}{(AC)(BC)}\right] = \cos^{-1}\left[\frac{-a^2}{a\sqrt{2}\,a\sqrt{5}}\right]$

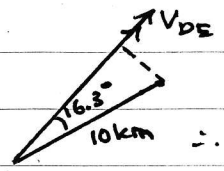
$= \cos^{-1}\left[\frac{-1}{\sqrt{10}}\right] = 108.4°$ #

5. $\underline{V}_{DE} = \underline{V}_D - \underline{V}_E = 21\begin{pmatrix}\sin 69°\\ \cos 69°\end{pmatrix} - 16\begin{pmatrix}\sin 76°\\ -\cos 76°\end{pmatrix}$

$= \begin{pmatrix}4.0805\\11.3965\end{pmatrix}$

$= 12.10 \text{ kmh}^{-1}$, to N $\tan^{-1}\left(\frac{4.0805}{11.3965}\right)$ E

$= 12.10 \text{ kmh}^{-1}$, to N 19.7° E



time taken $= \frac{10\cos 16.3°}{12.10}$ h

$= 48$ min.

$\therefore$ time happen $= 1248$ #

Shortest distance $= 10\sin 16.3° = 2.807$ km #

6. $\frac{dx}{dt} \propto x \Rightarrow \frac{dx}{dt} = kx$ # $(k>0)$

$\int_{100}^{x}\frac{dx}{x} = \int_0^t k\,dt \Rightarrow [\ln x]_{100}^{x} = k[t]_0^t$

$\therefore \ln\left(\frac{x}{100}\right) = kt$

$t=5$: $\ln 5 = 5k \Rightarrow \ln\left(\frac{x}{100}\right) = \frac{t}{5}\ln 5$ #

(a) $t=7.5$: Area not cover

$= 5000 - 100(5)^{7.5/5} = 3880 \text{ m}^2$ #

(b) $x=2000$: $t = 5\left[\frac{\ln 20}{\ln 5}\right] = 9.31$ days #

7. $P_1 = 0.42$, $P_2 = 0.25$, $P_3 = 0.13$, $P_4 = 0.2$ #

$P(X>2) = 0.13+0.2 = 0.33$ #

8. X = no. of adm per day, $X \sim Po(1.8)$

(i) $P(X=0) = e^{-1.8} = 0.1653$ #

(ii) Prob. $= P(X \geq 5)$

$= 1-e^{-1.8}\left[1+1.8+\frac{1.8^2}{2!}+\frac{1.8^3}{3!}+\frac{1.8^4}{4!}\right] = 0.0364$ #

LEE HOCK LEONG
M.Sc. (Pure Maths) – CGPA 4
B.Sc with Ed. (1st Class Hons.)

9.(i) $P(S) = P(T).P(S|T) + P(T').P(S|T')$

$= 0.9(0.85) + 0.1(0.4) = 0.805$ *

(ii) $P(T'|S) = \frac{P(T' \cap S)}{P(S)} = \frac{0.1(0.4)}{0.805} = \frac{8}{161}$ *

10. X = marks, $X \sim N(62, 12^2)$

(a) $P(X > 85) = P(Z > \frac{85-62}{12}) = 0.0276$

$\therefore$ Percentage $= 2.76\%$ *

(b) No. to fail $= 40 . P(X < 50)$

$= 40.P(Z < \frac{-12}{12}) = 40(0.1587) = 6.35 \approx 6$ *

(c) $P(X > k) = 0.05$: $\frac{k-62}{12} = z_{0.05} = 1.645$

$\therefore k = 83.74 \approx 84$ *

11. (a) $\int_0^1 (ax^2+bx+1)\,dx = 1$

$\therefore \left[\frac{ax^3}{3} + \frac{bx^2}{2} + x\right]_0^1 = 1 = \frac{a}{3} + \frac{b}{2} + 1$

$\therefore a = -\frac{3}{2}b$

$E(X) = \frac{2}{3}$: $\int_0^1 [ax^3 + bx^2 + x]\,dx = \frac{2}{3}$

$\therefore \left[\frac{ax^4}{4} + \frac{bx^3}{3} + \frac{x^2}{2}\right]_0^1 = \frac{2}{3} = \frac{a}{4} + \frac{b}{3} + \frac{1}{2}$

$\therefore \frac{1}{6} = \frac{1}{4}(-\frac{3}{2}b) + \frac{b}{3} \Rightarrow b = -4 \quad \therefore a = 6$ *

(b) $E(X^2) = \int_0^1 [6x^4 - 4x^3 + x^2]\,dx$

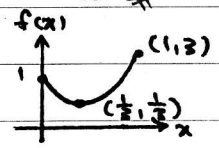
$= [\frac{6}{5}x^5 - x^4 + \frac{1}{3}x^3]_0^1 = \frac{6}{5} - 1 + \frac{1}{3} = \frac{8}{15}$

$\therefore Var(X) = \frac{8}{15} - (\frac{2}{3})^2 = \frac{4}{45}$ *

(c) $f(x) = 6x^2 - 4x + 1$

$= 6[x^2 - \frac{2}{3}x] + 1$

$= 6(x - \frac{1}{3})^2 + \frac{1}{3}$



(d) $P(\frac{1}{3} < X < \frac{2}{3}) = \int_{1/3}^{2/3} (6x^2 - 4x + 1)\,dx$

$= [2x^3 - 2x^2 + x]_{1/3}^{2/3}$

$= 2[\frac{8}{27} - \frac{1}{27}] - 2[\frac{4}{9} - \frac{1}{9}] + [\frac{2}{3} - \frac{1}{3}] = \frac{5}{27}$ *

12. (a)

3	0 2
4	1 3 6 8 8
5	2 2 2 4 7
6	1 5 6
7	1 2 3
8	2 4
9	3
10	0

key: 3|0 means 30

(b) $n = 22$, $\Sigma x = 1322$, $\Sigma x^2 = 86740$

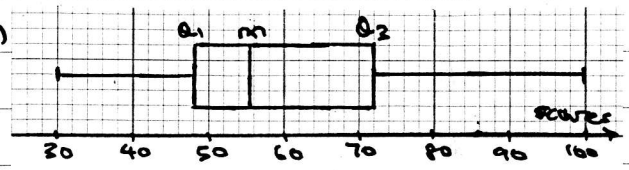
$\bar{x} = \frac{1322}{22} = 60\frac{1}{11}$ *

$s = \left[\frac{86740}{22} - (\frac{1322}{22})^2\right]^{1/2} = 18.22$ *

(c) $m = \frac{1}{2}[54 + 57] = 55.5$ *

$IQR = Q_3 - Q_1 = 72 - 48 = 24$ *

(d)



LEE HOCK LEONG
M.Sc. (Pure Maths) – CGPA 4
B.Sc with Ed. (1st Class Hons.)