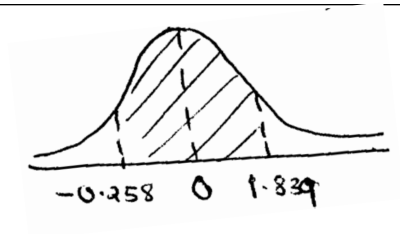
1.	$\int_2^3 \left(6x^2-1\right)dx = \frac{6x^2}{3} - x\Big]_2^3$ $= 2x^3 - x\Big]_2^3$ $= \left(2(3)^3-3\right)-\left(2(2)^3-2\right)$ $= (54-3)-(16-2)$ $= 51-14$ $= 37$		
2.	$\log_3^{(3x+1)} - \log_3^{(3x-11)} = 2$ $\log_3^{\left(\frac{2x+1}{3x-11}\right)} = 2$ $= \frac{2x+1}{3x-11} = 2^3$ $= \frac{2x+1}{3x-11} = \frac{9}{1}$ $= 9(3x-11) = 2x+1$ $= 27x-99 = 2x+1$ $= 25x = 100$ $x = \frac{100}{25} = 4$		
3.	$\underset{z_1}{r} \cdot \underset{z_2}{r} = \left(\underset{z_1}{r}\right)\left(\underset{z_2}{r}\right)\cos\vartheta$ $\begin{pmatrix}3\\2\\7\end{pmatrix} . \begin{pmatrix}2\\4\\{}^{-}4\end{pmatrix} = \sqrt{(3)^2+(2)^2+(7)^2} . \sqrt{(2)^2+(4)^2+\left({}^{-}5\right)^2}\cos\vartheta$ $6+8-35 = \sqrt{62}.\sqrt{45}\cos\vartheta$ $\cos\vartheta = \frac{{}^{-}21}{\sqrt{62\times45}}$ $\vartheta = \cos^{-1}\left(\frac{{}^{-}21}{\sqrt{2790}}\right)$ $\vartheta = 113.4$		
4.	Let x represent he weight of the students $p(66 \prec x \prec 79) = p\left(\frac{66-67.6}{6.2} \prec z \prec \frac{79-67.6}{6.2}\right)$ $= p(-0.258 \prec z \prec 1.839)$		



$= p(0 \prec z \prec 1.839) + p(0 \prec z \prec 0.258)$
$= 0.4670 + 0.1018$
$= 0.5688 (tab)$

5.

$xf(x)$	$x^2 f(x)$
0	0
0.3	0.3
1.0	2.0
0.6	1.8
$\sum x\ f(x) = 1.9$	$\sum x^2 f(x) = 4.1$

$\text{var}(x) = E(x^2) - (E(x))^2$
$= 4.1 - (1.9)^2$
$= 0.49$

6. Let S_9 and S_{10} be the distances moved after 9seconds and 0 seconds respectively

$u = 0ms^{-1}$

$S = ut + \frac{1}{2}at^2$

$S_9 = \frac{1}{2} \times a \times 81$

$= \frac{81a}{2}$

$S_{10} = \frac{1}{2} \times a \times 100$

$= \frac{100a}{2}$

$u = 0ms^{-1}$

$a = 1ms^{-1}$

$t = 5 \sec onds$

$S = ut + \frac{1}{2}at^2$

$S = \frac{1}{2}(1)(5)^2$

$S = \frac{25}{2} = 12.5m$

Distance m

In the 10th second

$S_{10} - S_9 = 9.5m$

$\frac{100a}{2} - \frac{81a}{2} = 9.5$

$19a = 19$

$a = 1ms^{-1}$

7.

$3x + y = 4$

$2x - 4y = 26$

$$\begin{pmatrix} 3 & 1 \\ 2 & ^-4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 26 \end{pmatrix}$$

$$\begin{pmatrix} ^-4 & ^-1 \\ ^-2 & 3 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ 2 & ^-4 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} ^-4 & ^-1 \\ ^-2 & 3 \end{pmatrix}\begin{pmatrix} 4 \\ 26 \end{pmatrix}$$

$$\begin{pmatrix} ^-12 {}^-2 & ^-4 + 4 \\ ^-6 + 6 & ^-2 {}^-12 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} ^-16 - 26 \\ ^-8 + 78 \end{pmatrix}$$

$$\begin{pmatrix} ^-14 & 0 \\ 0 & ^-14 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} ^-42 \\ 70 \end{pmatrix}$$

$^-14x = {}^-42$

$x = 3$

$^-14y = 70$

$y = 5$

$\therefore x = 3 and \; y = 5$

8.

R_x	R_y	d	d^2
1	1	0	0
8	8	0	0
5	5	0	0
2	2.5	-0.5	0.25
6.5	7	-0.5	0.25
6.5	6	0.5	0.25
10	10	0	0
3	2.5	0.5	0.25
4	4	0	0
9	9	0	0
			$\sum d^2 = 1$

$$\int = /-\frac{6\sum d^2}{b(n^2 - 1)}$$

$$= /-\frac{6}{10(99)}$$

$= 1 - 0.00606067$

$= 0.99393\overline{93}$

$\approx 0.9939(4dp)$

Comment: it is a very high positive correlation

9.

$S_n = \frac{n}{2}(2a + (n-1)d)$

$u_n = a + (n-1)d$

$u_5 = a + 4d$

$u_6 = a + 6d$

$3a + 15d = 95 \ldots\ldots\ldots.(i)$

$U_{10} = a + 9d = 49$

$a + 9d = 45 \ldots\ldots\ldots\ldots.(ii)$

Solving (i) and (ii)

$3(49 - 9d) + 15d = 95$

	$147-27d+15d=95$ $52=12d$ $d=\frac{13}{13}$ $a=49-9d$ $a=10$ $S_{22}=\frac{22}{2}(2(10))+(22-1)\frac{13}{3}$ $=11\left(20+11\left(\frac{13}{3}\right)\right)$ $=744.33333333333\overline{3}$ $\approx 744.333394dp)$ Total savings $=60000+(60000+5000)+(60000+215000)+60000+20(5000)$ $=20\times 60000+5000(1+2+3+---+20)$ $=1200000+5000\left(\frac{20}{2}(2(1))+19(1)\right)$ $=1200000+5000(10\|21\|)$ $=1200000+5000(210)$ $=shs.2,250,000$		
10.	$M_1=\frac{234+926+653+431}{4}$ $M_6=\frac{978+704+472+296}{4}$ $=\frac{2244}{4}=\frac{2450}{4}$ $=561.00=612.5$ $M_2=\frac{926+653+431+275}{4}$ $M_7=\frac{704+472+296+1003}{4}$ $=\frac{2285}{4}=\frac{2475}{4}$ $=571.25=618.75$ $M_3=\frac{431+431+275+978}{4}$ $M_8=\frac{472+296+1003+728}{4}$ $=\frac{2337}{4}=\frac{2499}{4}$ $=584.25=624.75$		

	$M_4 = \frac{431+275+978+704}{4}$ $M_9 = \frac{296+1003+728+498}{4}$ $= \frac{2388}{4} = \frac{2525}{4}$ $= 597 = 631.25$ $M_5 = \frac{275+978+704+472}{4}$ $= \frac{2429}{4}$ $= 607.25$ (c) $= \frac{103+728+498+x}{4} = 665$ $= \frac{2229+x}{4} = 665$ $x + 2229 = 2660$ $x = 2660 - 2229$ $x = 431$ Number of shows that were sold in the first quarter of 2016 was 431 pairs of shoes.		
11.	$p(AUB)^1 = -P(AUB) = \frac{1}{4}$ $p(PnA) + P(A).P(B) = \frac{1}{4} - 0$ $1 - (PCA) + P(B) - \frac{1}{4}) = \frac{1}{4}$ $P(A) + P(B) - \frac{1}{4} = 1 - \frac{1}{4}$ $\frac{4P(A) + 4P(B) - 1}{4} = \frac{3}{4}$ $4P(A) + 4P(B) = 4$ $P(A) + P(B) = 1............(i)$ $4p(A).p(B) = 1...............(ii)$ $4p(A)(1 - P(A)) = 1$ $4P(A) - 4P(P(A))^2 = 1$ $Utp(A) = t$ $4t - 4t^2 = 1$ $4t^2 - 4t + = 0$ $sum =^- 4$ $pud = 4$		

	$factors(-2,-2)$ $$4t^2-2t-2t+1=0$$ $$2t(2t-1)-(2t-1)=0$$ $$(2t-1)(2t-1)=0$$ $$t=\frac{1}{2}$$ $$p(A)=\frac{1}{2}$$ $$P(B)=1-P(A)$$ $$=1-\frac{1}{2}$$ $$=\frac{1}{2}$$ $$\therefore P(A)=0.5 and\ \ p(B)=0.5$$ $$P=0.6$$ $$Q=0.4$$ $$N=8$$ $$E(x)=nP$$ $$=8\times0.6=4.8$$ $$\approx 5drivers$$ $$(ii)\,p(x=3)={}^8_3C(0.6)^3(0.4)^5$$ $$=0.1239(4dp)cal$$ $$(iii)\,p(x\succ 6)=p(x\geq 7)$$ $$=p(x=7)+p(x=8)$$ $$={}^8_7\ C(0.6)^7(0.4)^1+{}^8_8\ C(0.6)^8(0.4)^0$$ $$=0.0896+0.0168$$ $$0.1064(4dp)cal$$		
12.	$y=x^3-\frac{2}{3}x^2-6x+12$ $\frac{d^2y}{dx^2}=3x^3-2\frac{3}{2}x-6$ $=3x^2-3x-6$ $=3(x^2-x-2)$ $\frac{d^2y}{dx^2}=6x-3$ $=3(2x-1)$ $3x^2-3x-6=0$		

	$x^2 - x - 2 = 0$ $sum = -1$ $pud = -2$ $factor(-2,1)$ $x^2 + x - 2x - 2 = 0$ $x(x+1) - 2(x+1) = 0$ $(x-2)(x+1) = 0$ $x = 2$ or $x^{-}1$ When $x = 2$ $y = (-1)^3 - \frac{2}{3}(2)^2 - 6(2) + 12$ $= -1 - \frac{2}{3} + 6 + 12$ $= \frac{-2 - 3 + 12 + 24}{2}$ $= \frac{31}{2}$ $\therefore$ stationary points are (2,2) and (-1, $\frac{31}{2}$) Nature $\frac{d^2y}{dx^2} \downarrow_{x=2} = 6(2) - 3 = 9 \succ 0 \rightarrow \text{min}$ $\frac{d^2y}{dx^2} \downarrow_{x=1} = 6(-1) - 3 = -9 \prec 0 \rightarrow \text{max}$ $(2,2)$ is a minima and $(-1, \frac{31}{2})$ is a maxima b) $\frac{dy}{dx} = 3 + 9x$ $\int dy = \int (3 + 9x)dx$ $y = 3x + \frac{9x^2}{2} + C$ $15 = 3(2) + \frac{9}{2}(2)^2 + C$ $15 = 6 + 18 + C$ $15 = 24 + C$ $C = -9$ $\therefore 2y = 6x + 9x^2 - 9$ or $y = 3x + \frac{9}{2}x^2 - 9$		
13.			

Ages	f	x	fx	cf	Class boundaries
16-20	6	18	108	6	15.5 – 20.5
21-25	12	23	276	18	20.5 – 25.5
26-30	7	28	196	25	25.5 – 30.5
31-35	5	33	165	30	30.5 – 35.5
36-40	6	38	228	36	35.5 – 40.5
	$\sum f = 36$		$\sum fx = 973$		

B(i) mean $= \dfrac{\sum fx}{\sum f}$

$= \dfrac{973}{36}$

$= 27.0278 years (4dp)$

(ii) Mode $= Lot\left(\dfrac{d_1}{d_1 + d_2}\right)C$

$= 20.5 + \left(\dfrac{6}{6+5}\right).5$

$= 23.2273 years (4dp)$

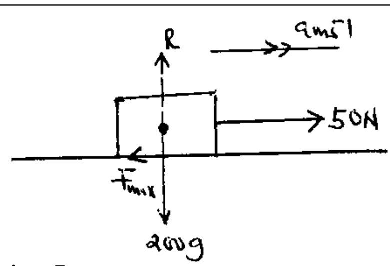
(c) Percentage of women who marry at an age of 30 and above

$= \dfrac{40.24.4}{40} \times 100\%$

$= \dfrac{15.6}{40} \times 100\%$

$= 39\%$

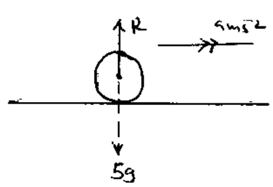
14.



Using F=ma

$50 - F \max = 0 ----------(i)$

$F_{\max} = 50N$



	$U = 0ms^{-1}$ $V = 10ms^{-1}$ $workdone = 50$ $t = ?$ $S = 100m$ $Fxd = 50$ $100F = 50$ $F = \frac{5}{10} = \frac{1}{2}$ $Ma = \frac{1}{2}$ $a = \frac{1}{2} \div \frac{1}{5}$ $a = \frac{1}{2} \times \frac{5}{1}$ $a = 2.5ms^{-1}$ Using $V = u + at$ $10 = 0 + 2.5t$ $t = \frac{10}{2.5} = 4\sec onds$:. It takes 4seconds to move a distance of 100m		