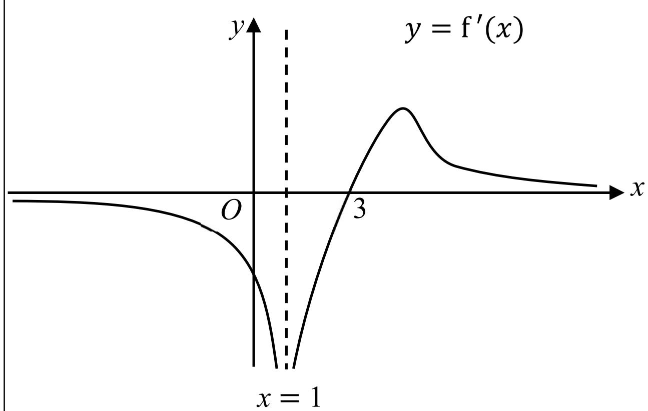
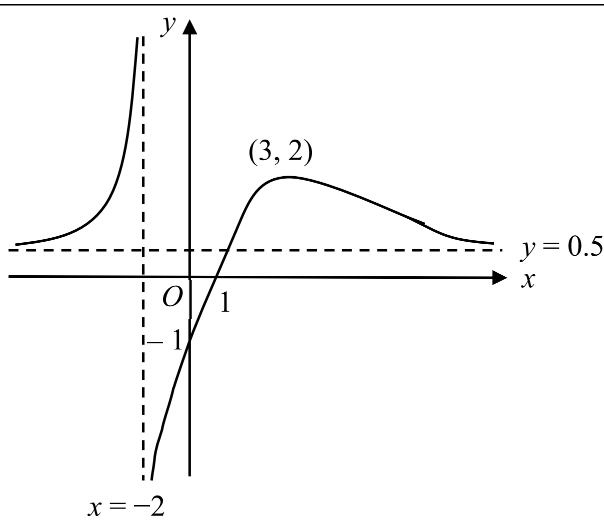
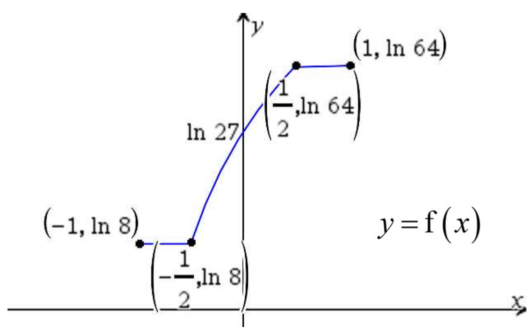
2022 JC2 H2MA Preliminary Examination Paper 2

1(a)	Let $u = x \Rightarrow \dfrac{\mathrm{d}u}{\mathrm{d}x} = 1$ $\dfrac{\mathrm{d}v}{\mathrm{d}x} = (4-2x)^{-\frac{1}{2}} \Rightarrow v = -(4-2x)^{\frac{1}{2}}$ $I = \displaystyle\int \frac{x}{\sqrt{4-2x}}\ \mathrm{d}x$ $= -x(4-2x)^{\frac{1}{2}} + \displaystyle\int (4-2x)^{\frac{1}{2}}\ \mathrm{d}x$ $= -x(4-2x)^{\frac{1}{2}} + \dfrac{(4-2x)^{\frac{3}{2}}}{\frac{3}{2}(-2)} + C$ $= -x(4-2x)^{\frac{1}{2}} - \dfrac{(4-2x)^{\frac{3}{2}}}{3} + C$
(b)	$u = 4-2x \ \Rightarrow \dfrac{\mathrm{d}u}{\mathrm{d}x} = -2$ $I = \displaystyle\int \frac{x}{\sqrt{4-2x}}\ \mathrm{d}x$ $= \displaystyle\int \frac{4-u}{2\sqrt{u}} \left(-\frac{1}{2}\right)\mathrm{d}u$ $= \displaystyle\int \frac{u-4}{4\sqrt{u}}\ \mathrm{d}u$ $= \displaystyle\int \frac{1}{4}u^{\frac{1}{2}} - u^{-\frac{1}{2}}\ \mathrm{d}u$ $= \dfrac{1}{6}u^{\frac{3}{2}} - 2u^{\frac{1}{2}} + D$ $= \dfrac{1}{6}(4-2x)^{\frac{3}{2}} - 2(4-2x)^{\frac{1}{2}} + D$

(c)	$\left[-x(4-2x)^{\frac{1}{2}}-\frac{(4-2x)^{\frac{3}{2}}}{3}+C\right]-\left[\frac{1}{6}(4-2x)^{\frac{3}{2}}-2(4-2x)^{\frac{1}{2}}+D\right]$ $=-x(4-2x)^{\frac{1}{2}}-\frac{(4-2x)^{\frac{3}{2}}}{3}-\frac{1}{6}(4-2x)^{\frac{3}{2}}+2(4-2x)^{\frac{1}{2}}+C-D$ $=(4-2x)^{\frac{1}{2}}\left[-x-\frac{1}{3}(4-2x)-\frac{1}{6}(4-2x)+2\right]+C-D$ $=(4-2x)^{\frac{1}{2}}\left(-x+\frac{2}{3}x+\frac{1}{3}x-\frac{4}{3}-\frac{2}{3}+2\right)+C-D$ $=(4-2x)^{\frac{1}{2}}(0)+C-D$ $=C-D$ (shown)

Qn	Solution
2(a)	
2(b)	

3(a)	Largest possible $k=-1.5$ $y=x^2+3x-1$ $=(x+1.5)^2-2.25-1$ $(x+1.5)^2=y+3.25$ $x=-1.5\pm\sqrt{y+3.25}$ since $x\le -1.5$ $x=-1.5-\sqrt{y+3.25}$ $\mathrm{f}^{-1}(x)=-1.5-\sqrt{x+3.25}$
(b)	$\mathrm{f}(x)=\mathrm{f}^{-1}(x)$ Since the graphs of f and f^{-1} intersect at $y=x$, $\mathrm{f}(x)=x$ $x^2+3x-1=x$ $x^2+2x-1=0$ $x=\dfrac{-2\pm\sqrt{2^2-4(-1)}}{2}$ $=\dfrac{-2\pm\sqrt{8}}{2}$ $x=-1-\sqrt{2}$ or $x=-1+\sqrt{2}$ Since $x\le -2$, $\therefore\ x=-1-\sqrt{2}$
(c)	fg does not exist as $\mathrm{R}_g=[0,\infty)\not\subseteq \mathrm{D}_\mathrm{f}=(-\infty,-2]$ gf exists as $\mathrm{R}_\mathrm{f}=[-3,\infty)\subseteq D_g=[-5,\infty)$ $\mathrm{gf}(x)=\mathrm{g}(x^2+3x-1)$ $=\sqrt{x^2+3x-1+5}$ $=\sqrt{x^2+3x+4},\ x\le -2$
(d)	$\mathrm{R}_\mathrm{f}=[-3,\infty)$ $\mathrm{R}_{\mathrm{gf}}=[\sqrt{2},\infty)$

	Solution
4(a)	$\ln\left(2x+3\right)^3 = 3\ln(2x+3) = 3g(2x+3)$ where $g(x) = \ln x$. This is the sequence of transformations: (1) Translate the graph $y = \ln x$ 3 units in the negative x-direction (2) Scale parallel to x-axis by a scale factor of ½ (3) Scale parallel to y-axis by a scale factor of 3
(b)	
(c)	$y = \ln\left(2x+3\right)^3$ $e^y = (2x+3)^3$ $x = \frac{1}{2}\left(\left(e^y\right)^{\frac{1}{3}} - 3\right)$ $x^2 = \frac{1}{4}\left(e^{\frac{y}{3}} - 3\right)^2$ Required volume = volume of cylinder, with radius 1, height (ln 64 – ln 27) $-\pi\int_{\ln 27}^{\ln 64} x^2 \, dy$ $= \pi(1^2)(\ln 64 - \ln 27) - \pi\int_{\ln 27}^{\ln 64} \frac{1}{4}\left(e^{\frac{y}{3}} - 3\right)^2 \, dy$ = 2.501 (to 3 d.p.)

5(a)	**Method 1**

$\overrightarrow{AB} = \begin{pmatrix} 0 \\ 4 \\ 2 \end{pmatrix} - \begin{pmatrix} 4 \\ 2 \\ -1 \end{pmatrix} = \begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}$

l: $\mathbf{r} = \begin{pmatrix} 0 \\ 4 \\ 2 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}, t \in \mathbb{R}$ or $\mathbf{r} = \begin{pmatrix} 4 \\ -2 \\ 1 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}, t \in \mathbb{R}$

Plane p: $\mathbf{r} = \begin{pmatrix} 6 \\ 2 \\ -5 \end{pmatrix} + \lambda\begin{pmatrix} 0 \\ 3 \\ -1 \end{pmatrix} + \mu\begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix}$

Normal of plane p:

$\begin{pmatrix} 0 \\ 3 \\ -1 \end{pmatrix} \times \begin{pmatrix} 2 \\ -2 \\ 1 \end{pmatrix} = \begin{pmatrix} 3(1)-(-2)(-1) \\ -(0(1)-2(-1)) \\ 0(-2)-2(3) \end{pmatrix} = \begin{pmatrix} 1 \\ -2 \\ -6 \end{pmatrix}$

Plane p: $\mathbf{r} \cdot \begin{pmatrix} 1 \\ -2 \\ -6 \end{pmatrix} = \begin{pmatrix} 6 \\ 2 \\ -5 \end{pmatrix} \cdot \begin{pmatrix} 1 \\ -2 \\ -6 \end{pmatrix} = 32$

Let X be the point of intersection between plane p and line l.

$\overrightarrow{OX} = \begin{pmatrix} 0 \\ 4 \\ 2 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}$, for some $t \in \mathbb{R}$

Or $\overrightarrow{OX} = \begin{pmatrix} 4 \\ 2 \\ -1 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}$, for some $t \in \mathbb{R}$

Since X lies on p,

$\left[\begin{pmatrix} 0 \\ 4 \\ 2 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}\right] \cdot \begin{pmatrix} 1 \\ -2 \\ -6 \end{pmatrix} = 32$

$(-8-12) + t(-4-4-18) = 32$

$-26t = 52$

$t = -2$

or

$\left[\begin{pmatrix} 4 \\ 2 \\ -1 \end{pmatrix} + t\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix}\right] \cdot \begin{pmatrix} 1 \\ -2 \\ -6 \end{pmatrix} = 32$

$(4-4+6) + t(-4-4-18) = 32$

$-26t = 26$

$t = -1$

$\overrightarrow{OX} = \begin{pmatrix} 0 \\ 4 \\ 2 \end{pmatrix} - 2\begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 8 \\ 0 \\ -4 \end{pmatrix}$ or $\overrightarrow{OX} = \begin{pmatrix} 4 \\ 2 \\ -1 \end{pmatrix} - \begin{pmatrix} -4 \\ 2 \\ 3 \end{pmatrix} = \begin{pmatrix} 8 \\ 0 \\ -4 \end{pmatrix}$

The coordinates of the point of intersection is $(8, 0, -4)$

Method 2

	Equating $\mathbf{r}=\begin{pmatrix}0\\4\\2\end{pmatrix}+t\begin{pmatrix}-4\\2\\3\end{pmatrix}, t\in\mathbb{R}$ and $\mathbf{r}=\begin{pmatrix}6\\2\\-5\end{pmatrix}+\lambda\begin{pmatrix}0\\3\\-1\end{pmatrix}+\mu\begin{pmatrix}2\\-2\\1\end{pmatrix},$ $\begin{pmatrix}0\\4\\2\end{pmatrix}+t\begin{pmatrix}-4\\2\\3\end{pmatrix}=\begin{pmatrix}6\\2\\-5\end{pmatrix}+\lambda\begin{pmatrix}0\\3\\-1\end{pmatrix}+\mu\begin{pmatrix}2\\-2\\1\end{pmatrix}$ $-4t=6+0\lambda+2\mu \Rightarrow 0\lambda+2\mu+4t=-6$ ---- (1) $4+2t=2+3\lambda-2\mu \Rightarrow 3\lambda-2\mu-2t=2$ ---- (2) $2+3t=-5-\lambda+\mu \Rightarrow -\lambda+\mu-3t=7$ ---- (3) Using GC, $\lambda=0,\ \mu=1,\ t=-2$ When $t=-2$, $\overrightarrow{OX}=\begin{pmatrix}0\\4\\2\end{pmatrix}-2\begin{pmatrix}-4\\2\\3\end{pmatrix}=\begin{pmatrix}8\\0\\-4\end{pmatrix}$ The coordinates of the point of intersection is $(8,0,-4)$.
(b)	Let the equation of either plane be $\mathbf{r}\bullet\begin{pmatrix}1\\-2\\-6\end{pmatrix}=D$. Distance between either plane and plane $p=\sqrt{41}$ $\Rightarrow \left\lvert \dfrac{D-32}{\sqrt{1^2+2^2+6^2}} \right\rvert=\sqrt{41}$ $\Rightarrow \left\lvert \dfrac{D-32}{\sqrt{41}} \right\rvert=\sqrt{41}$ $\Rightarrow D-32=41$ or $D-32=-41$ $\Rightarrow D=73$ or $D=-9$ $\therefore$ the equations of the planes are $\mathbf{r}\bullet\begin{pmatrix}1\\-2\\-6\end{pmatrix}=73$ or $\mathbf{r}\bullet\begin{pmatrix}1\\-2\\-6\end{pmatrix}=-9$ $x-2y-6z=73$ or $x-2y-6z=-9$

(c)	$m:\mathbf{r}=\begin{pmatrix}1\\-2\\3\end{pmatrix}+t\begin{pmatrix}-3\\1\\a\end{pmatrix}, t\in\mathbb{R}$ Since p and m do not meet in a unique point, p and m are parallel. $\begin{pmatrix}-3\\1\\a\end{pmatrix}\cdot\begin{pmatrix}1\\-2\\-6\end{pmatrix}=0$ $-3-2-6a=0$ $a=-\frac{5}{6}$

6(a)	<u>**Method 1:**</u> Case 1: 3W2M – No. of ways $={}^7C_3\,{}^5C_2=350$ Case 2: 4W1M – No. of ways $={}^7C_4\,{}^5C_1=175$ Case 3: 5W0M – No. of ways $={}^7C_5\,{}^5C_0=21$ Total number of ways $=350+175+21=546$ <u>**Method 2:**</u> (Using complementary method) Case 1: 0W5M – No. of ways $={}^7C_0\,{}^5C_5=1$ Case 2: 1W4M – No. of ways $={}^7C_1\,{}^5C_4=35$ Case 2: 2W3M – No. of ways $={}^7C_2\,{}^5C_3=210$ Total number of ways $={}^{12}C_5-1-35-210=546$
6(b)	Required probability $=\frac{(7-1)!\times 2!\times {}^6C_4\times 4!}{(12-1)!}$ $=\frac{1}{77}$

7(a)	$\mathrm{P}(X)$ $=\mathrm{P}(\text{Two 3s or two 9s and one other})$ $=\mathrm{P}(A3, B\text{ any}, C3)+\left[\mathrm{P}(A9, B9, C\text{ not}9)\right.$ $\left.+\mathrm{P}(A9, B\text{ not}9, C9)+\mathrm{P}(A\text{ not}9, B9, C9)\right]$ $=\left(\frac{1}{4}\right)\left(\frac{5}{5}\right)\left(\frac{1}{8}\right)+\left[\left(\frac{1}{4}\right)\left(\frac{2}{5}\right)\left(\frac{5}{8}\right)+\left(\frac{1}{4}\right)\left(\frac{3}{5}\right)\left(\frac{3}{8}\right)+\left(\frac{3}{4}\right)\left(\frac{2}{5}\right)\left(\frac{3}{8}\right)\right]$ $=\frac{21}{80}$
7(b)	$\mathrm{P}(X\cap Y)=\mathrm{P}(A5, B9, C9)$ $=\left(\frac{1}{4}\right)\left(\frac{2}{5}\right)\left(\frac{3}{8}\right)$ $=\frac{3}{80}$ $\mathrm{P}(Y)=\mathrm{P}(A5, B\text{ any}, C\text{ any})=\frac{1}{4}$ $\mathrm{P}(X)\times\mathrm{P}(Y)=\frac{21}{320}\neq\mathrm{P}(X\cap Y)$ Therefore, events X and Y are not independent.
7(c)	$\mathrm{P}(\text{One ball is numbered 7} \mid X)$ $=\frac{\mathrm{P}(A3, B7, C3)+\mathrm{P}(A9, B7, C9)}{\mathrm{P}(X)}$ $=\frac{\left(\frac{1}{4}\right)\left(\frac{1}{5}\right)\left(\frac{1}{8}\right)+\left(\frac{1}{4}\right)\left(\frac{1}{5}\right)\left(\frac{3}{8}\right)}{\frac{21}{80}}$ $=\frac{2}{21}$
8(a)	Possible values of T are $\{a, 2a, b, 3b\}$. Since $\mathrm{P}(T=2a)=\mathrm{P}(T=3b)=\frac{1}{6}$, then $\mathrm{P}(T=a)+\mathrm{P}(T=b)=\frac{4}{6}$. If $\mathrm{P}(T=a)=\mathrm{P}(T=b)=\frac{2}{6}$, then the modes of T are a and b, which contradicts the question. Hence, $\mathrm{P}(T=a)=\frac{3}{6}=\frac{1}{2}$ and $\mathrm{P}(T=b)=\frac{1}{6}$.

t	a	$2a$	b	$3b$
$\mathrm{P}(T=t)$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

8(b)

$$\mathrm{E}(T)=a\left(\frac{1}{2}\right)+2a\left(\frac{1}{6}\right)+b\left(\frac{1}{6}\right)+3b\left(\frac{1}{6}\right)$$
$$=\frac{5}{6}a+\frac{2}{3}b$$

Given that $\mathrm{E}(T)=\frac{25}{6}$,

$$\frac{5}{6}a+\frac{2}{3}b=\frac{25}{6}\Rightarrow b=\frac{25}{4}-\frac{5}{4}a$$
$$=\frac{5}{4}(5-a)$$

$$\mathrm{E}\left(T^2\right)=a^2\left(\frac{1}{2}\right)+(2a)^2\left(\frac{1}{6}\right)+b^2\left(\frac{1}{6}\right)+(3b)^2\left(\frac{1}{6}\right)$$
$$=\frac{1}{2}a^2+\frac{2}{3}a^2+\frac{1}{6}b^2+\frac{3}{2}b^2$$
$$=\frac{7}{6}a^2+\frac{5}{3}b^2$$

$$\mathrm{Var}(T)=\mathrm{E}\left(T^2\right)-\left[\mathrm{E}(T)\right]^2$$
$$=\frac{7}{6}a^2+\frac{5}{3}b^2-\left(\frac{25}{6}\right)^2$$
$$=\frac{7}{6}a^2+\frac{5}{3}\left[\frac{5}{4}(5-a)\right]^2-\frac{625}{36}$$
$$=\frac{7}{6}a^2+\frac{125}{48}(5-a)^2-\frac{625}{36}$$
$$=\frac{181}{48}a^2-\frac{625}{24}a+\frac{6875}{144}$$

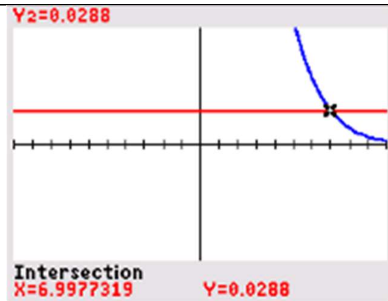
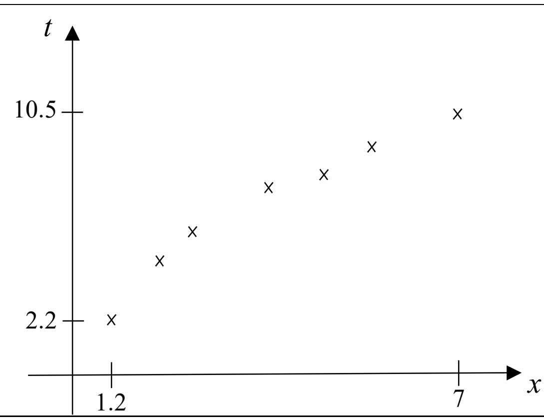
9(a)

$$X\sim B\left(75,\frac{p}{100}\right)$$

$\mathrm{P}(X\le 1)=0.0288$

$$\binom{75}{0}\left(\frac{p}{100}\right)^0\left(1-\frac{p}{100}\right)^{75}+\binom{75}{1}\left(\frac{p}{100}\right)\left(1-\frac{p}{100}\right)^{74}=0.0288$$

$$\left(1-\frac{p}{100}\right)^{75}+\frac{3}{4}p\left(1-\frac{p}{100}\right)^{74}=0.0288$$

	 p =6.9977 (to 4 d.p.)
9(b)	$X \sim B(75, 0.075)$ From GC, $\mathrm{P}(X=4)=0.1517$ $\mathrm{P}(X=5)=0.1747$ $\mathrm{P}(X=6)=0.1652$ The most likely number of bouquets with LED lights made in a day is 5.
9(c)	$X \sim \mathrm{B}(75, 0.075)$ $\mathrm{E}(X)=75\times 0.075=5.625,$ $\mathrm{Var}(X)=75(0.075)(1-0.075)=5.203125$ Since $n=30$ is large, by Central Limit Theorem, $\bar{X} \sim \mathrm{N}\left(5.625, \frac{5.203125}{30}\right)$ approximately Required probability $\mathrm{P}(\bar{X}\geq 5)$ $=0.933$ (3 sf)
10 (a)	
10 (b)	The product moment correlation coefficient for case (i) is 0.9965 (to 4 d.p.) while that of the case (ii) is -0.9182 (to 4 d.p.).

10 (c)	Considering the values of $\lvert r \rvert$, since the value for case (i) is closer to 1 as compared to that of case (ii), there is a stronger linear correlation between ln x and t as compared to e^{-x} and t. Hence case (i) is more appropriate. A suitable regression line of t on ln x will be $t = 1.309671 + 4.517503 \ln x$ $t = 1.31 + 4.52 \ln x$ (to 3 s.f.)
10 (d)	As x is the controlled variable, regression line of t on ln x should be used even though we are asked to estimate x. $t = 1.309671 + 4.517503 \ln x$ When $t = 8.5$, $x \approx 4.911896 \approx 4.91$ Since $r = 0.9965$ is close to +1 and that $t = 8.5$ is within the data range of t, the estimate of the value of quantity of chemical applied to the metal is reliable.
11 (a)	Unbiased estimate of the population mean $\bar{x} = \frac{186.35}{50} + 70$ $= 73.727$ Unbiased estimate of the population variance $s^2 = \frac{1}{49}\left(10494 - \frac{186.35^2}{50}\right)$ ≈ 199.989 ≈ 200 (3 s.f.)
11 (b)	$H_0 : \mu = 70$ $H_1 : \mu \neq 70$ Test at 5% significance level. Under H_0, since $n = 50$ is large, by Central Limit Theoremo, $\bar{X} \sim \mathrm{N}\left(70, \frac{199.989}{50}\right)$ approximately, where $s^2 \approx 199.989$ is a good estimate of σ^2. Using GC, p-value = 0.0624 > 0.05 Do not reject H_0 and conclude that there is insufficient evidence, at 5% significance level, that the population mean mass of duck eggs is not equal to 70 grams.

	Hence Farm A's claim is valid.
11 (c)	No, it is not necessary to assume that X is normally distributed as the sample size of 50 is large. Central Limit Theorem could be applied and thus $\bar{X}$ is approximately normally distributed and a Z test can be carried out.
11 (d)	There is a probability of 0.05 that **the test will indicate** that the **population mean mass** of duck eggs is not 70 grams when in fact it is 70 grams.
	Unbiased estimate of the population variance $s^2 = \frac{40}{39}(146)$ $= 149.744$ Let Y be the mass, in grams, of a randomly chosen duck egg from Farm B . $H_0 : \mu = 70$ $H_1 : \mu > 70$ Test at 3% significance level. Under H_0 , since $n = 40$ is large, by Central Limit Theorem, $\bar{Y} \sim \mathrm{N}\left(70\,,\ \frac{149.744}{40}\right)$ approximately, where $s^2 \approx 149.744$ is a good estimate of σ^2. OR or $\bar{Y} \sim \mathrm{N}\left(70\,,\ \frac{146}{39}\right)$ approximately, where $s^2 = 40 \times \frac{146}{39}$ is a good estimate of σ^2. Since Farm B's claim is valid, we reject H_0. $\frac{k-70}{\sqrt{\frac{149.744}{40}}} \geq 1.8808$ OR $\frac{k-70}{\sqrt{\frac{146}{39}}} \geq 1.8808$ $k - 70 \geq 3.6390$ $k \geq 73.639$ $k \geq 73.6$ (3 s.f.) $\{k \in \mathbb{R} : k \geq 73.6\}$
12 (a)	Let W be the random variable denoting the mass of a randomly chosen packet of white sugar.

	$W \sim \mathrm{N}\left(1.05,\ 0.03^2\right)$ Let k kg be the mass exceeded by 80% of the packets of white sugar. $\mathrm{P}\left(W > k\right) = 0.8$ $k = 1.025 \quad (3 \text{ d.p.})$
12 (b)	98% of the labelled mass is 0.98 kg $\mathrm{P}\left(W < 0.98\right) = 0.0098153$ Let X be the number of packets of white sugar, out of 10, that are underweight. $X \sim \mathrm{B}\left(10,\ 0.0098153\right)$ $\mathrm{P}\left(X \le 1\right) = 0.996 \quad (3 \text{ s.f.})$
12 (c)	Let B be the random variable denoting the mass of a randomly chosen packet of brown sugar. $B \sim \mathrm{N}\left(m,\ 0.05^2\right)$ $\mathrm{P}\left(W_1 + W_2 + W_3 + W_4 > 2B\right) = 0.15$ Let $S = W_1 + W_2 + W_3 + W_4 - 2B$ $\mathrm{E}\left(S\right) = 4 \times 1.05 - 2m$ $= 4.2 - 2m$ $\mathrm{Var}\left(S\right) = 4 \times 0.03^2 + 2^2 \times 0.05^2$ $= 0.0136$ $S \sim N\left(4.2 - 2m\ ,\ 0.0136\right)$ $\mathrm{P}\left(S > 0\right) = 0.15$ $\mathrm{P}\left(Z > \dfrac{0 - 4.2 + 2m}{\sqrt{0.0136}}\right) = 0.15$ $\dfrac{2m - 4.2}{\sqrt{0.0136}} = 1.03643338$ $m = \dfrac{1}{2}\left(4.2 + 1.03643338\sqrt{0.0136}\right)$ $m \approx 2.16 \quad (3 \text{ s.f.})$
12 (d)	$B \sim \mathrm{N}\left(2.03,\ 0.05^2\right)$ Let $A = \dfrac{1}{9}\left(W_1 + W_2 + W_3 + W_4 + B_1 + B_2 + B_3 + B_4 + B_5\right)$ $\mathrm{E}\left(A\right) = \dfrac{1}{9}\left[4 \times 1.05 + 5 \times 2.03\right] = 1.59444$ $\mathrm{Var}\left(A\right) = \dfrac{1}{81}\left[4 \times 0.03^2 + 5 \times 0.05^2\right]$ $= \dfrac{1}{81}\left(0.0161\right) \quad or \quad 0.0001987654321$

	$A \sim \mathrm{N}\left(1.59444,\ \dfrac{0.0161}{81}\right)$ $\mathrm{P}\left(A > 1.6\right) = 0.347$ (3 s.f.)