

Solutions

1a.

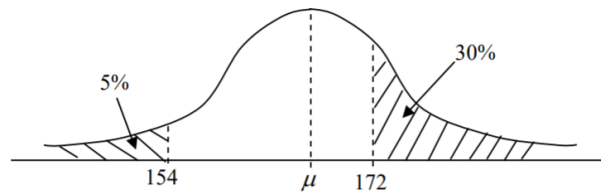
The random variable $H \sim$ height of females. $P(H > 170) = P\left(Z > \frac{170-160}{8}\right)$	M1
$= P(Z > 1.25)$	
$= 1 - 0.8994$	M1
$= 0.1056\dots$	
$= 0.106$	M1

1b.

$P(H > 180) = P\left(Z > \frac{180-160}{8}\right)$	M1
$= 0.0062$	M1
$P(H > 180 \mid H > 170) = \frac{0.0062}{0.1056}$	M1
$= 0.058776\dots$	
$= 0.0587$	M1

Solutions

1a.



Bell shaped, must have inflections	M1
154, 172 on axis.	M1
5% and 30%	M1

1b.

$P(X < 154) = 0.05$	M1
$\frac{154 - \mu}{\sigma}$	M1
$\frac{154 - \mu}{\sigma} = -1.6449$	M1
$\mu = 154 + 1.6449\sigma$	M1

1c.

$172 - \mu = 0.5244\sigma$	M1
Solving simultaneously with 'part b' equation	M1
$\sigma = 8.2976075... = 8.30$	M1
$\mu = 167.64873... = 168$	M1

Solutions

1a.

Let X be the amount of beans in a tin, $P(X < 200) = 0.1$ $\frac{200 - \mu}{7.8}$	M1
$\frac{200 - \mu}{7.8} = -1.2816$	M1
$\mu = 209.96\dots$ $\mu = 10$	M1

1b.

$P(X > 225) = P(Z > \frac{225 - 210}{7.8})$	M1
$P(Z > 1.92)$	M1
$= 1 - 0.9726$ $= 0.0274$ (allow 2.7%/0.027)	M1



Solutions

1.

$H_0 : p = 0.15$	M1
$H_1 : p \neq 0.15$	M1
$X \sim B(30, 0.15)$	M1
$P(X \leq 1) = 0.0480$	M1
$0.0480 > 0.025$, Not a significance result therefore do not reject H_0 .	M1
There is no evidence of a change in the proportion of customers buying an item from the display.	M1



Solutions

1a.

$P(X > 168) = P(Z > \frac{168-160}{5})$	M1
$= P(Z > 1.6)$	M1
$= 0.0548$	

1b.

$P(X < w) = P(Z < \frac{w-160}{5})$	M1
$\frac{w-160}{5} = -2.3263$	M1
$w = 148.37$	M1

1c.

$\frac{160-\mu}{\sigma} =$	M1
$\frac{160-\mu}{\sigma} = 2.3263$	M1
$160 - \mu = 2.3263\sigma$	
$\frac{152-\mu}{\sigma} = -1.2816$	M1
$152 - \mu = -1.281\sigma$	
Solving simultaneously	M1
$\sigma = 2.21... = 2.22$	M1
$\mu = 154.84.... = 155$	M1



Solutions

1a.

$z = \frac{15-16.12}{1.6} = -0.70$	M1
$P(Z < -0.70) = 1 - 0.7580$	M1
$= 0.2420$	M1

1b.

$P(T < t) = 0.30$	M1
$z = \frac{t-16.12}{1.6}$	M1
$z = -0.5244$	M1
$\frac{t-16.12}{1.6} = -0.5244$	M1
$t = 15.28$	M1



Solutions

1a.

$P(W < 224) = P\left(z < \frac{224-232}{5}\right)$	M1
$= P(Z < -1.6)$	M1
$= 1 - 0.9452$	M1
$= 0.0548$	M1

1b.

$0.5 - 0.2 = 0.3$	M1
$\frac{w-232}{5} =$	M1
$\frac{w-232}{5} = 0.5244$	M1
$w = 234.622$	M1

1c.

$0.2 \times (1 - 0.2)$	M1
$2 \times 0.8 \times (1 - 0.8)$	M1
$= 0.32$	M1

