MEI STATISTICS 2 JUNE 2008 Q3 NORMAL

3 i) $X \sim N(27500, 4000^2)$

i)

X	25000	27500
Z	-0.625	0

$$z = \frac{x - \mu}{\sigma}$$

$$z = \frac{25000 - 27500}{4000}$$

$$z = -0.625$$

$$P(X > 25000) = P(Z > -0.625) = P(Z < 0.625)$$

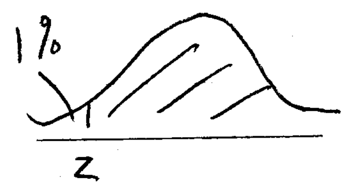
$$= 0.7340$$

ii) $X \sim B(10, 0.734)$

$$P(X = 7) = {}^{10}C_7 \times 0.734^7 \times 0.266^3$$

$$= 0.2592$$

iii) $X \sim N(27500, 4000^2)$



$$z = -\Phi^{-1}(0.99)$$

$$z = -2.326$$

$$z = \frac{k - \mu}{\sigma}$$

$$\sigma z = k - \mu$$

$$\sigma z + \mu = k$$

$$k = 4000(-2.326) + 27500$$

$$k = 18196 \text{ miles}$$

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3iv) $X \sim N(27500, 4000^2)$

For sample of 15 vans

$$\bar{X} \sim N\left(27{,}500, \left(\frac{4000}{\sqrt{15}}\right)^2\right)$$

$H_0 : \mu = 27500$ miles

$H_1 : \mu > 27500$ miles

where μ is the mean life for all new type of tyres

v) For 5% significant level test - single tail at upper end

critical value of $z = \Phi^{-1}(0.95) = 1.645$

$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{15}}} = \frac{28630 - 27500}{\frac{4000}{\sqrt{15}}}$$

$$z = 1.094$$

Since $1.094 < 1.645$

there is not sufficient evidence to reject H_0

Accept there is not sufficient evidence to suggest the new type of tyre has an increased mean lifetime in excess of the accepted value of 27500 miles