Stats 1 - 4 Normal

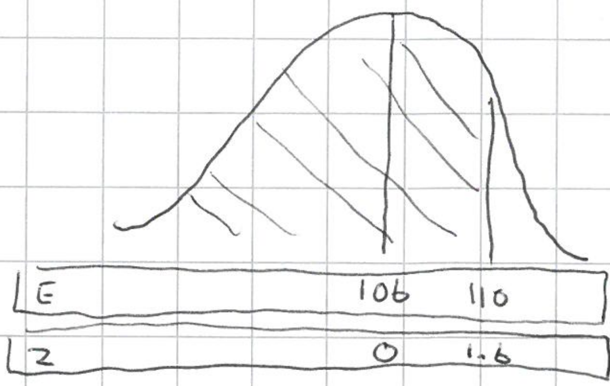
1. $E \sim N(106, 2.5^2)$

a) $P(E < 110)$

$= P\left(Z < \frac{110-106}{2.5}\right)$

$= P(Z < 1.6)$

$= 0.94520$



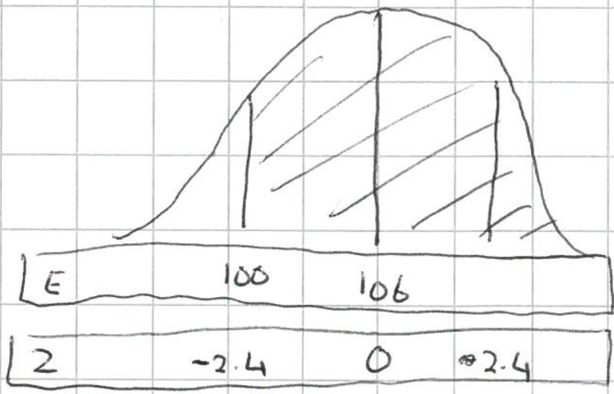
b) $P(E > 100)$

$= P\left(Z > \frac{100-106}{2.5}\right)$

$= P(Z > -2.4)$

$= P(Z < 2.4)$

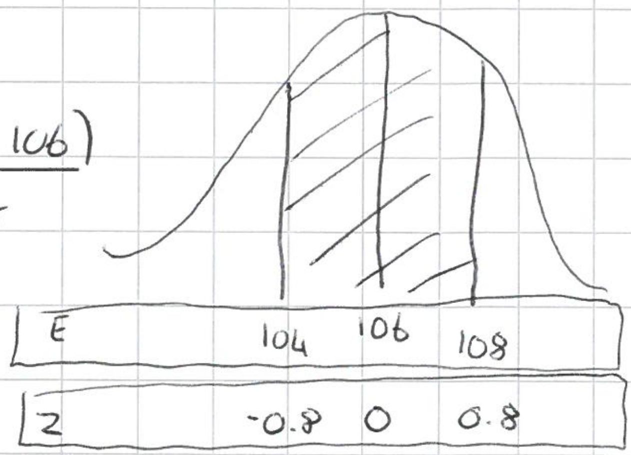
$= 0.99180$



c) $P(104 < E < 108)$

$= P\left(\frac{104-106}{2.5} < Z < \frac{108-106}{2.5}\right)$

$= P(-0.8 < Z < 0.8)$



=

$= P(Z < 0.8) - P(Z < -0.8)$

$= 0.78814 - [1 - P(Z < 0.8)]$

$= 0.78814 - 1 + 0.78814$

$= 0.57628$

d) $P(E \neq 106) = 1$

(2) $X \sim N(2200, 160^2)$

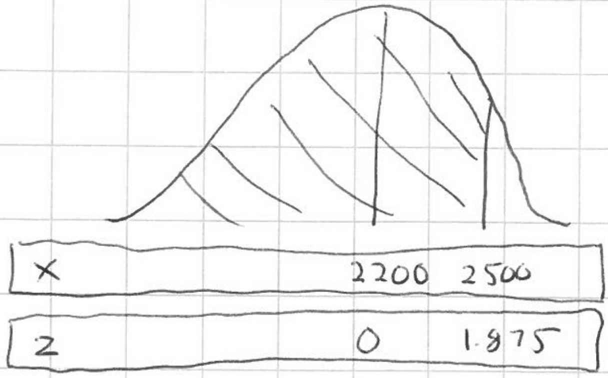
a) i) $P(X < 2500)$

$= P\left(Z < \dfrac{2500 - 2200}{160}\right)$

$= P(Z < 1.875)$

Look up 1.88

$= 0.96995$



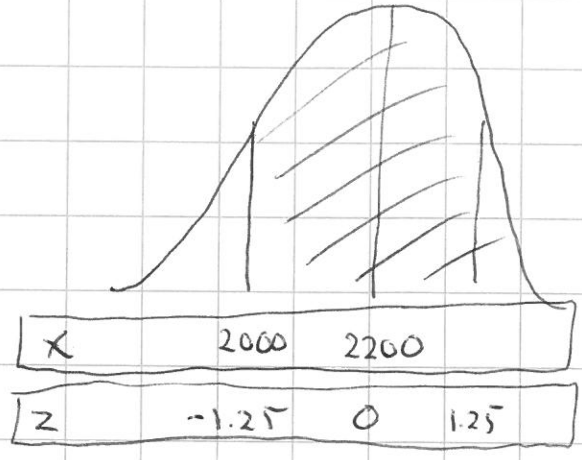
ii) $P(X > 2000)$

$= P\left(Z > \dfrac{2000 - 2200}{160}\right)$

$= P(Z > -1.25)$

$= P(Z < 1.25)$

$= 0.89435$



iii) $P(2000 < X < 2500)$

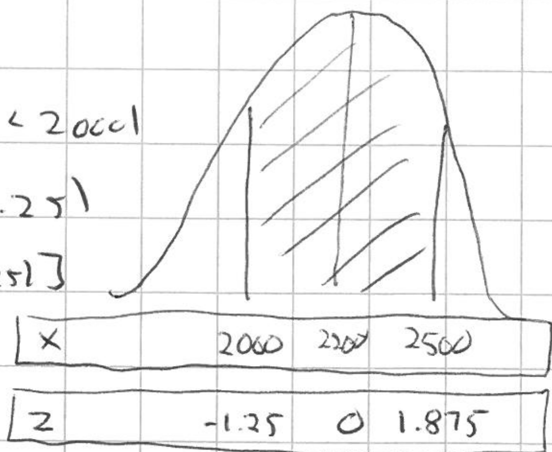
$= P(X < 2500) - P(X < 2000)$

$= P(Z < 1.875) - P(Z < -1.25)$

$= 0.96995 - [1 - P(Z < 1.25)]$

$= 0.96995 - [1 - 0.89435]$

$= 0.8639$



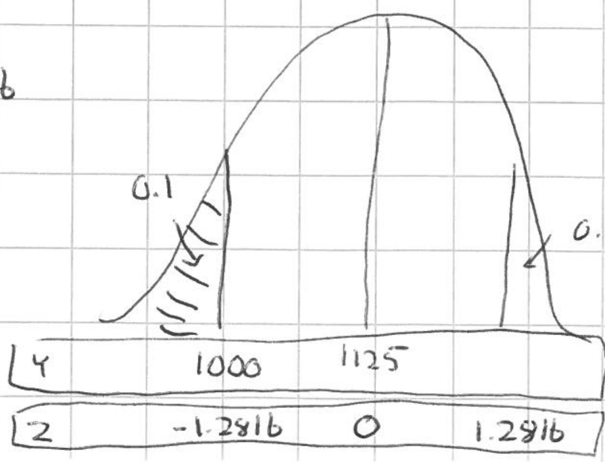
b) $Y \sim N(1125, \sigma^2)$

Look up 0.9 on p 25 $\rightarrow Z = 1.2816$

$\rightarrow \dfrac{1000 - 1125}{\sigma} = -1.2816$

$\rightarrow \sigma = {-125}/{-1.2816}$

$= 97.534\ldots$



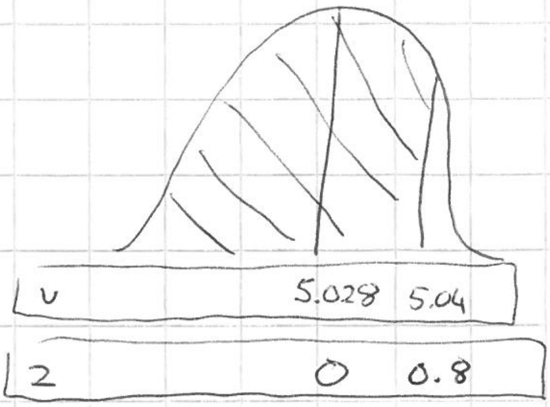
(3) $V \sim N(5.028,\ 0.015^2)$

a) i) $P(V < 5.04)$

$= P\left(Z < \dfrac{5.04 - 5.028}{0.015}\right)$

$= P(Z < 0.8)$

$= 0.78814$



ii) $P(V > 5)$

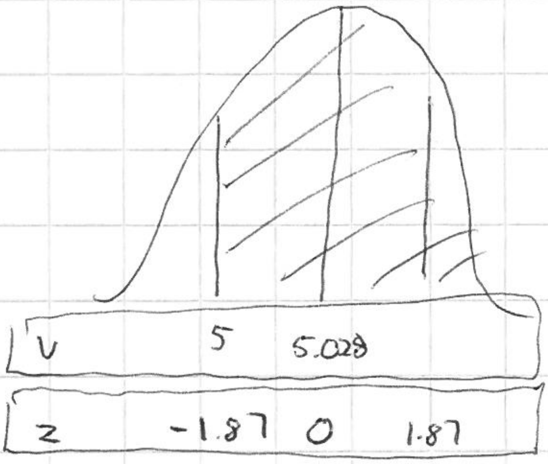
$= P\left(Z > \dfrac{5 - 5.028}{0.015}\right)$

$= P(Z > -1.8666\ldots)$

Look up $P(Z > -1.87)$

$= P(Z < 1.87)$

$= 0.96903$



b) Just like 95% confidence interval.

$\rightarrow z = 1.96$ (look up 0.975)

Standardise:

$\dfrac{5.028 + v - 5.028}{0.015} = 1.96$

$v = 1.96 \times 0.015$

$= 0.0294$