MEI STATISTICS 2 JANUARY 2006 Q2 NORMAL

2 i) $X \sim N(42.0, 3.0^2)$

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

A) when $x = 50$, $z = \frac{50-42}{3}$

$P(X > 50) = P(Z > 2.667)$ $\quad z = 2.667$

$= 1 - P(Z < 2.667)$

$= 1 - 0.9962$

$= 0.0038$

B) $P(\text{At least 1 +ve}) = 1 - P(\text{All -ve})$

$= 1 - 0.9962^7$

$= 0.0263$

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c) 2.63 % of innocent athletes likely to receive penalty.

This would seem unfair

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2 ii)

A) $X \sim B(1000, 0.0038)$

B) $np = 3.8$

$npq = 3.78556$

Approximate with

$X \sim \text{Poisson}(3.8)$

$P(X \geq 10) = 1 - P(X \leq 9)$

$= 1 - 0.9942 \quad = 0.0058$

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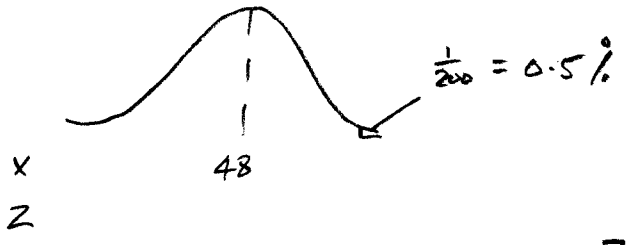
2iii) $X \sim N(48.0, 2.0^2)$



$z = \Phi^{-1}(0.995)$

$z = 2.576$

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

$\sigma z + \mu = x$

$2 \times 2.576 + 48.0 = x$

$x = 53.152$

Set $h = 53.15$