

2012 P2 Q8.

(i) let  $A, B, C$  denote scores of car, truck, motorcycle respectively

$$A \sim N(70, 9^2)$$

$$B \sim N(69, 5^2)$$

$$C \sim N(63, 11^2).$$

$$B - C \sim N(6, 146).$$

$$P(B > C) = P(B - C > 0) \approx 0.690. \text{ (3SF)} //$$

$$\text{cii) } \frac{A_1 + A_2 + A_3}{3} \sim N\left(70, \frac{9^2}{3}\right).$$

$$\underline{P}\left(\frac{A_1 + A_2 + A_3}{3} < 65\right) \approx 0.168 \text{ (3SF)}$$

ciii)

$$T = 0.7\left(\frac{A_1 + A_2 + A_3}{3}\right) + 0.15B + 0.15C \sim N(68.8, 16.515)$$

$$\underline{P}(T > k) \leq 0.05.$$

$$\underline{P}(T \leq k) \geq 0.95.$$

$$k \geq 75.484$$

$\therefore$  minimum  $k = 76$  (nearest whole #)