

Question #1

Key: E

The 40th percentile is the $.4(12) = 4.8^{\text{th}}$ smallest observation. By interpolation it is $.2(86) + .8(90) = 89.2$. The 80th percentile is the $.8(12) = 9.6^{\text{th}}$ smallest observation. By interpolation it is $.4(200) + .6(210) = 206$.

The equations to solve are

$$.4 = \frac{(89.2 / \theta)^\gamma}{1 + (89.2 / \theta)^\gamma} \quad \text{and} \quad .8 = \frac{(206 / \theta)^\gamma}{1 + (206 / \theta)^\gamma} .$$

Solving each for the parenthetical expression gives $\frac{2}{3} = (89.2 / \theta)^\gamma$ and $4 = (206 / \theta)^\gamma$.

Taking the ratio of the second equation to the first gives $6 = (206 / 89.2)^\gamma$ which leads to $\gamma = \ln(6) / \ln(206 / 89.2) = 2.1407$. Then $4^{1/2.1407} = 206 / \theta$ for $\theta = 107.8$.