ECO239 Quiz2 Answer (Jan.6. 2010)

$X \sim N(10, 25)$

A. Find the following probabilities

① ① $P(X>12) = P(Z > \frac{12-10}{5}) = P(Z > 0.4) = 1 - P(Z < 0.4)$

$= 1 - F(0.4) = 1 - 0.6554 = 0.3446$

② ② $P(11<X<13) = P(\frac{11-10}{5} < Z < \frac{13-10}{5}) = P(0.2 < Z < 0.6)$

$= F(0.6) - F(0.2) = 0.7257 - 0.5793$

$= 0.1464$

② ③ $P(9<X<11) = P(\frac{9-10}{5} < Z < \frac{11-10}{5}) = P(-0.2 < Z < 0.2)$

$= F(0.2) - F(-0.2) = F(0.2) - [1 - F(0.2)]$

$= 2 * 0.5793 - 1 = 0.1586$

② ④ $P(8<X<9) = P(\frac{8-10}{5} < Z < \frac{9-10}{5}) = P(-0.4 < Z < -0.2)$

$= P(0.2 < Z < 0.4) = F(0.4) - F(0.2)$

$= 0.6554 - 0.5793 = 0.0761$

B. Find the value of X so that only 10% of all values are below the X

② $P(X < X_0) = 0.1 \rightarrow P(Z < -Z_0) = 0.1$

$\rightarrow P(Z > Z_0) = 0.1 \rightarrow P(Z < Z_0) = 0.9$

Look for "0.4" inside the table

$Z_0 = 1.28 \rightarrow -Z_0 = -1.28$.

$\rightarrow X_0 = \mu + \sigma(-Z_0) = 10 + 5(-1.28) = 3.6$