R6.4

Tip: Read problem carefully and define RV's and their distributions

DEFINE: T = Torque APPLIED IN CAPPING machine
C = Cap strength

STATE DISTRIBUTIONS: $T \sim N(7, 0.9)$
$C \sim N(10, 1.2)$

ANSWER QUESTIONS

(A) T and C ARE INDEPENDENT because the machine that makes the Cap and the the machine that applies the Torque ARE NOT THE SAME MACHINES

(B) New RV for the difference: $D = C - T$

$\mu_D = \mu_C - \mu_T = 10 - 7 = 3 \text{ IN/lb}$

$\sigma_D = \sigma_C^2 + \sigma_T^2 = \sqrt{0.9^2 + 1.2^2} = 1.5 \text{ IN/lb}$

(C) $D \sim N(3, 1.5)$

Write a prob. stmt to understand relationship between T and C. To BREAD CAP $\longrightarrow P(T > C)$
Then use algebra to express probability based on $D = C - T$

$P(T > C) =$
$P(0 > C - T) =$
$P(C - T < 0)$

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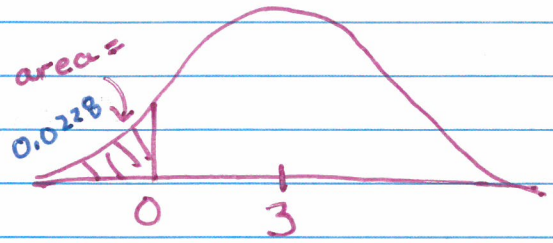
R 6.4 C (continued)

(C) $D \sim N(3, 1.5)$

$P(C - T < 0) \longrightarrow P(D < 0)$

Normal Graph for D:



FIND Z AND USE IT

$Z = \frac{0-3}{1.5}$ $\boxed{Z = -2}$

$P(Z \leq -2) = 0.0228$ (use normalcdf)

∴ The probability the cap will break is about 2% of the time