Math/Stat 511 $\boxed{\text{HW\#12}}$ Friday 4/20/01

§4.4, pages 201-205

#5a) Z is $N(0,1)$. To find c so that

$P(Z \geq c) = .025$, notice $P(Z \geq c) = 1 - \Phi(c)$

and do a reverse table look-up for $\Phi(c) = .975$

or

$$\boxed{c \doteq 1.96}$$

#6) $M_X(t) = e^{166t + 200t^2} \Rightarrow X$ is a normal random variable

with $\mu = 166$ & $\frac{1}{2}\sigma^2 = 200$ (or $\sigma = 20$).

(a) $\boxed{\mu = 166}$ (b) $\boxed{\sigma = 20}$

(c) $P(170 < X < 200) = P\left(\frac{170-166}{20} < \frac{X-166}{20} < \frac{200-166}{20}\right)$

$= P(.2 < Z < 1.7) = \Phi(1.7) - \Phi(.2)$

$= .9554 - .5793 = \boxed{.3761}$

(d) $P(148 < X < 172) = P\left(-\frac{18}{20} < Z < \frac{6}{20}\right) = \Phi(.3) - \Phi(-.9)$

$= \boxed{.4338}$

#21) X is $N(7,4)$, compute $P[15.364 \leq (X-7)^2 \leq 20.096]$. [Here $\mu = 7$, $\sigma^2 = 4$]

this is χ^2, $r=1$ $\Big\}$ $P[3.841 \leq Z^2 \leq 5.024] = .975 - .950 = \boxed{.025}$

$\boxed{\text{Extra Credit \#22}}$ The MGF of X is $e^{500t + 5000t^2} \Rightarrow X$ is normally distibuted

with $\mu = 500$ & $\sigma^2 = 10^4$. Use χ^2 with $r = 1$:

$P[27{,}060 \leq (X-500)^2 \leq 50{,}240] = P[2.706 \leq Z^2 \leq 5.024]$

$= .975 - .900 = \boxed{.075}$