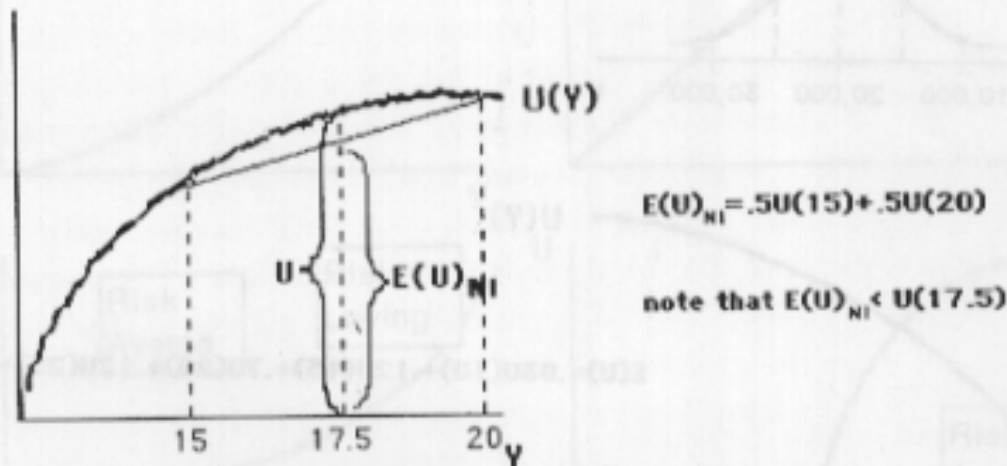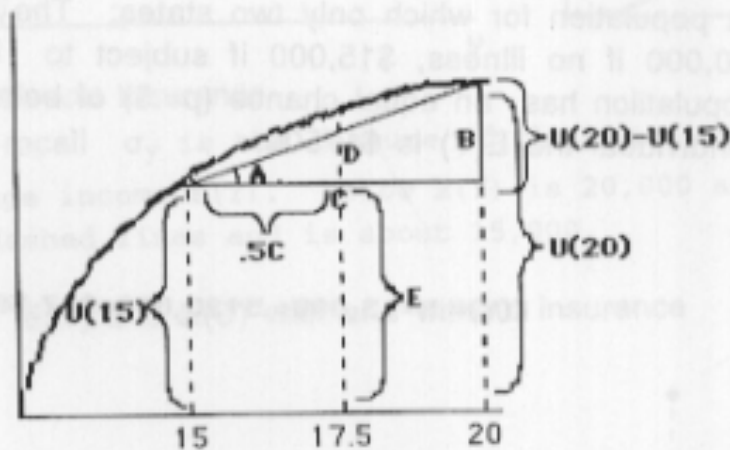i. Without insurance

E(Y)=17,500.   Let $E(U)_{NI}$ denote expected utility without insurance As illustrated below $E(U)_{NI} < U(17,500)$ because of uncertainty. $E(U)_{NI}$ is the point on the cord joining U(15000) and U(20000) which is above 17500. (On page   it is demonstrated goemetrically that this the the E(U) when there is an equal chance of \$15000 and \$20000.

$$E(U)_{NI} = .5U(15) + .5U(20)$$

note that $E(U)_{NI} < U(17.5)$

To   show that the height of the cord gives us the expected utility without insurance consider the following diagram:

$$E(U)_{NI} = .5U(15) + .5U(20)$$