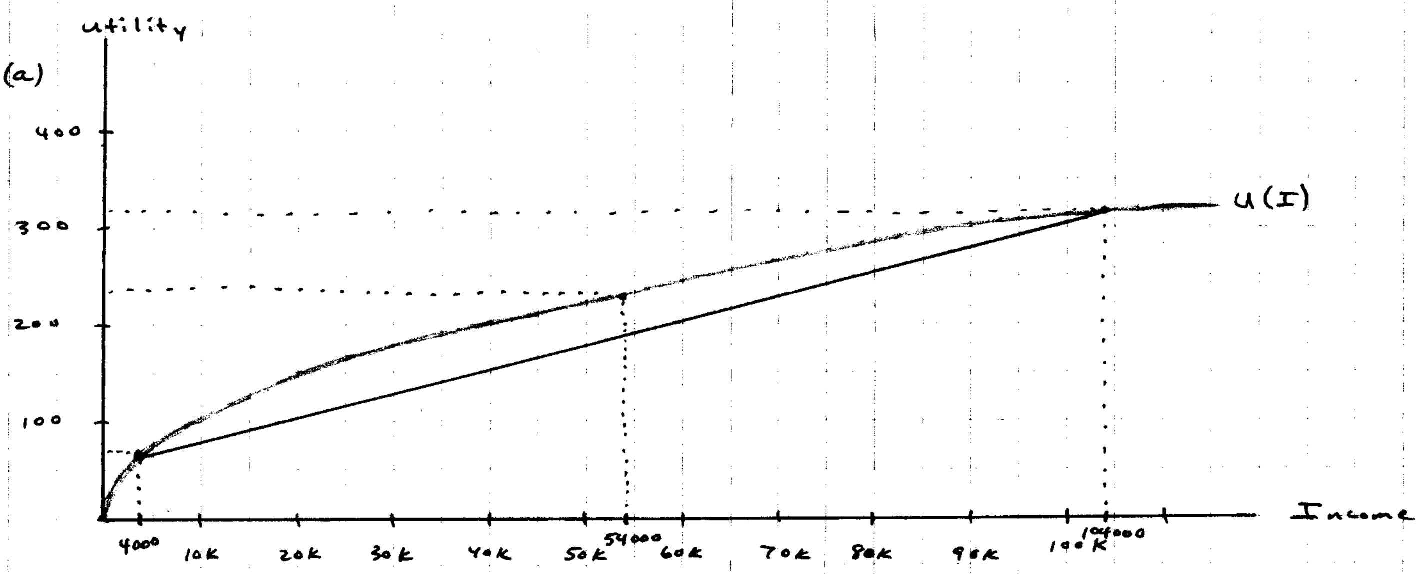
ECO 601 Problem Set #6 KEY Fall 2004

1. (a)




(b) $u = I^{1/2}$

$u(4000) = 63.25$

$u(54000) = 232.38$

$u(104000) = 322.49$

Expected utility of gamble $= \frac{1}{2}u(4000) + \frac{1}{2}u(104000) = 192.87$

Bump up base salary but keep \$100,000 bonus:

$$\frac{1}{2}u(x) + \frac{1}{2}u(x + 100000) = 232.38$$

$$x^{1/2} + (x + 100{,}000)^{1/2} = 464.76$$

$$(x + 100{,}000)^{1/2} = 464.76 - x^{1/2}$$

$$x + 100{,}000 = 216{,}001.86 - 929.52\,x^{1/2} + x$$

$$929.52\,x^{1/2} = 116{,}001.86$$

$$x^{1/2} = 124.8$$

$x = \$15{,}574.44$ base salary would make her indifferent.

(c) Alternatively, increase the bonus but keep base salary at \$4000:

$$\frac{1}{2}u(4000) + \frac{1}{2}u(4000 + B) = 232.38$$

$$\frac{1}{2}(63.25) + \frac{1}{2}(4000 + B)^{1/2} = 232.38$$

$$\frac{1}{2}(4000 + B)^{1/2} = 200.755$$

$$(4000 + B)^{1/2} = 401.51$$

$$4000 + B = \$161{,}210.28$$

$B = \$157{,}210.28$ : bonus that would make her indifferent.

2. (a) probability of burglary = .10
loss if burglary = \$20,000
expected loss = \$2000 = actuarially fair premium
Since the household's utility of wealth function is concave, they would pay this premium.

(b) Expected utility if no insurance:

$$.9 \cdot \ln(100{,}000) + .1 \ln(80{,}000) = 11.49$$

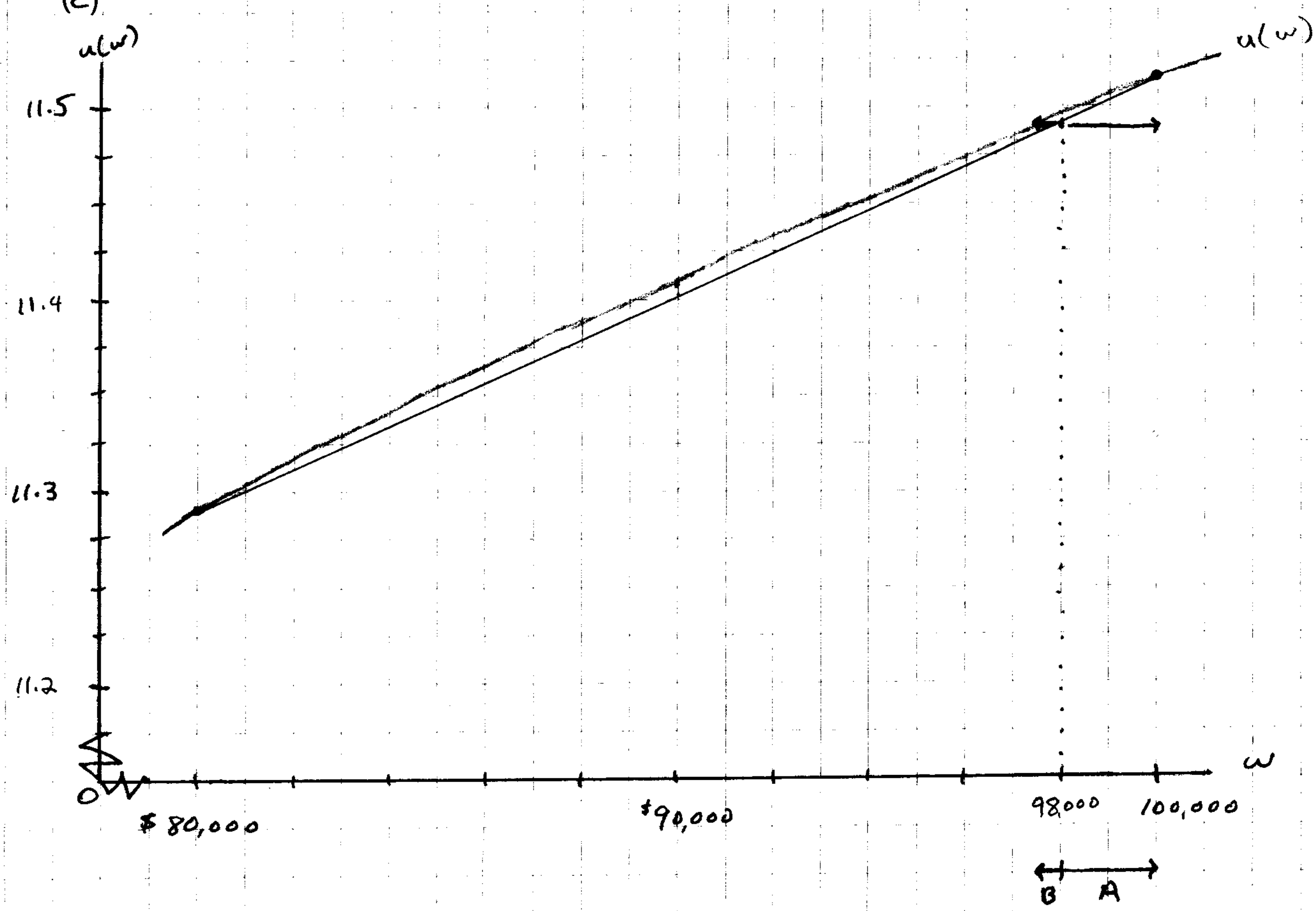
What level of wealth with certainty would give them an equal level of utility?

$$\ln(w) = 11.49$$

$$w = e^{11.49} = \$97{,}793.28$$

so they would pay up to \$2,206.72 to avoid taking the gamble.

(c)




$u(80{,}000) = 11.29$

$u(100{,}000) = 11.51$

A = actuarially fair premium
B = loading factor

3. If a household is insured against losses from burglary, they will have less incentive to take precautions against burglary and may therefore increase the likelihood of a burglary occurring and/or the magnitude of the loss if a burglary does occur. Such a change in behavior is known as moral hazard.

4. If the same premium is charged to households for whom the probability of a burglary is low and/or the magnitude of the loss if a burglary does occur is low and to households where the probability and/or magnitude are high, then adverse selection may occur. Households with low expected losses from burglary will be less likely to purchase insurance than households with high expected losses. The insurance company will be left with a pool of high risk customers and not a random sample of all households.