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ODAY'S SUBJECT Insurance DATE 2/16/17

- Optimization Problems

→ How do you maximize a function?

* Extreme points: maximums, minimums, points of inflection.
* At extreme points, the derivative of the function must be equal to zero.

→ $EU(Y) = (1-\pi)U(Y_1) + \pi U(Y_2)$

$Y_1 = W - pC$

$Y_2 = W - L + C - pC$

* 1st Derivative: $\frac{dEU(Y)}{dC} = (1-\pi)\frac{dU(Y_1)}{dY_1} \cdot \frac{dY_1}{dC} + \pi \frac{dU(Y_2)}{dY_2} \cdot \frac{dY_2}{dC}$

$= (1-\pi)U'(Y_1)(-p) + \pi U'(Y_2)(1-p)$

- $\frac{d[(1-\pi)U(Y_1)]}{dC} = (1-\pi)\frac{dU(Y_1)}{dC}$

$Y_1 = W - pC$ $\left[\text{If } C \uparrow \ \frac{dY_1}{dC} = -p\right]$

$\frac{dU(Y_1)}{dC} = \frac{dU(Y_1)}{d(Y_1)} \cdot \frac{d(Y_1)}{dC}$

$= U'(Y_1)(-p)$

- $Y_2 = W - L + (1-p)C$

$\frac{d(Y_2)}{dC} = (1-p)$

$\frac{dU(Y_2)}{dC} = \frac{dU(Y_2)}{d(Y_2)} \cdot \frac{d(Y_2)}{dC}$

$= U'(Y_2)(1-p)$