Micro HW7

Michael B. Nattinger*

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1 Question 1

1.1 Part A

Let u be linear, so for some $c, d \in \mathbb{R}$, $u(m) = cm + d$. Then, $U(a) = pu(w + 2a) + (1 - p)u(w-a) = p(c(w+2a)+d)+(1-p)(c(w-a)+d) = pcw+2pca+cw-ca+d-pcw+pca-pd = (3p-1)ca+cw+d-pd$. $a = \arg\max_{0\leq a\leq w}(3p-1)ca+cw+d-pd = \arg\max_{0\leq a\leq w}(3p-1)ca$. If $3p-1 > 0 \Rightarrow p > \frac{1}{3}$ then the objective function is maximized when a is maximized, so $a = w$. If $3p-1 < 0 \Rightarrow p < \frac{1}{3}$ then the objective function is maximized when a is minimized, so $a = 0$.

1.2 Part B

$U'(0) = pu'(w) + (1-p)u'(0) > 0$ because $u'(x)$ is positive as u is strictly increasing.

1.3 Part C

Let $a, b \in (0, w)$ and let $t \in (0, 1)$. $U(ta + (1-t)b) = pu(w + 2(ta + (1-t)b)) + (1 - p)u(w - (ta + (1-t)b))$

1.4 Part D

1.5 Part E

1.6 Part F

1.7 Part G

1.8 Part H

*I worked on this assignment with my study group: Alex von Hafften, Andrew Smith, Ryan Mather, and Tyler Welch. I have also discussed problem(s) with Emily Case, Sarah Bass, and Danny Edgel.