All Syracuse University policies and procedures concerning academic honesty apply to this course:

"Syracuse University students shall exhibit honesty in all academic endeavors. Cheating in any form is not tolerated, nor is assisting another person to cheat. The submission of any work by a student is taken as a guarantee that the thoughts and expressions in it are the student's own except when properly credited to another. Violations of this principle include: giving or receiving aid in an exam or where otherwise prohibited, fraud, plagiarism, the falsification or forgery of any record, or any other deceptive act in connection with academic work. Plagiarism is the representation of another's words, ideas, programs, formulae, opinions, or other products of work as one's own either overtly or by failing to attribute them to their true source." (Section 1.0, University Rules and Regulations)
1. Recall our employment model where we have:

   Effort: $E$, $0 \leq E \leq 1$

   Von Neumann-Morgenstern utility function:
   $$U = W \cdot (1 - E)$$

   Reservation utility: $W > 0$ (Exogenous)

   Probability caught shirking: $\pi(E) = 1 - E$

   Revenue function: $V(L_E) = L_E^{1/2}$
   $$V(0) = 0; \quad V' > 0, \quad V'' < 0$$

   Profit function: $R(W, L_E) = L_E^{1/2} - W \cdot L = L_E^{1/2} - W \cdot L_E/E$

We are going to modify this by changing the probability caught shirking to $\pi(E) = 1 - E^\alpha$ for $\alpha \geq 1$. Show that the equilibrium wage does **not** depend on $\alpha$. [Do not worry about global existence.]

2. Now go back to the original employment model (including $\pi(E) = 1 - E$) and modify it by changing the worker’s utility function to

   $$U = W^b \cdot (1 - E) \text{ for } b > 0$$

Show exactly how the equilibrium wage **does** depend on $\alpha$. [Do not worry about global existence.]
3. Consider the following social choice rule, where there are three individuals and five alternatives: \( X = \{a,b,c,d,e\} \) and where we assume strong preferences (i.e., no individual is indifferent between any two distinct alternatives).

At profile \( u \), the social choice \( g(u) \) is determined by going through two stages. First, find the set \( S \) of all alternatives that defeat alternative \( a \) under simple majority vote. That is, \( S \) is the set of all \( x \) such that at least two of the three prefer \( x \) to \( a \).

At the second stage, if \( S \) is empty, set \( g(u) = a \). If \( S \) is non-empty, set \( g(u) \) equal to the alternative in \( S \) that is highest in individual \#1's ordering at \( u \).

For this rule \( g \), find a profile \( u \) at which someone has an incentive to submit a false preference ordering.

4. When individuals have preferences

\[
u_i(x, \theta_i) = k\theta_i + (m_i + t_i)
\]

consider the revelation mechanism

Choose \( k(\tilde{\theta}) = 1 \) if \( \sum \tilde{\theta}_i \geq c \); 0 otherwise.

\[
t_i(\tilde{\theta}) = -k \cdot \sum \tilde{\theta}_j / n.
\]

Assume \( \Theta_i = \mathbb{R}_+ \) for all \( i \).

(A) Argue that for this rule, no one individual has an incentive to choose a \( \tilde{\theta}_i > \theta_i \) when everyone else tells the truth.

(B) Is there an example that when everyone else is telling the truth, two individuals both choosing a \( \tilde{\theta}_i > \theta_i \) can improve their outcome over what they get if they tell the truth?