Public Economics Midterm (100 points)
October 17, 2024 Name: _____

Write your answers in the space provided.

1. Consider the following preference relation on the set $\{a, b, c\}$:

$$a \succsim a, b \succsim b, c \succsim c, a \succsim b, b \succsim a, a \succsim c, b \succsim c$$

(a) (5 points) Is it complete?

(b) (5 points) Is it transitive?

(c) (5 points) Write the indifference relation $\sim$

(d) (5 points) Write the strict preference relation $\succ$

(e) (5 points) Write any utility function that represents these preferences.

$$U(a) = \qquad U(b) = \qquad U(c) =$$

(f) (5 points) Graph the preference relation.

2. Three people $P = \{1, 2, 3\}$ have preferences over the set of outcomes $O = \{a, b, c\}$. Their preferences are:

$$a \succ_1 c \succ_1 b$$
$$a \succ_2 c \succ_2 b$$
$$c \succ_3 a \succ_3 b$$

(a) (5 points) What outcomes strictly Pareto dominate others?

(b) (5 points) What are the Pareto efficient outcomes?

(c) (5 points) What **social preferences** results from applying the preference aggregation rule **Borda Count** to these preferences? Use 3 points for a first-ranked outcome, 2 for a second-ranked outcome, and 1 for a third-ranked outcome.

(d) (5 points) What **choice** results from applying the social choice function **plurality vote** to these preferences?

(e) (5 points) In the example above, change the preferences in a way that demonstrates the social choice function plurality vote **does not respect IIA**. Why does your example violate IIA? *Hint: keep the relationship between a and c constant in everyone's preferences. Only change where b is ranked.*

3. (10 points) Three people $P = \{1, 2, 3\}$ have preferences over the set of outcomes $O = \{a, b, c\}$. **Provide a social choice function** that is **nonempty**, **Pareto efficient**, and **IIA** (that is, it does not violate IIA).

4. Three people $P = \{1, 2, 3\}$ have preferences over the set of outcomes $O = \{a, b, c\}$. Plurality vote is used to pick a social choice. If there is a tie, the outcome that is earliest in the alphabet wins. Suppose that each person's preferences are:

$$a \succ_1 c \succ_1 b$$

$$b \succ_2 c \succ_2 a$$

$$c \succ_3 a \succ_3 b$$

   (a) (5 points) Plurality vote with the alphabetic tie-breaking rule described above always results in **exactly one outcome being chosen**. This property is known as:

   (b) (5 points) The outcome chosen by plurality vote with the alphabetic tie-breaking rule described above is:

   (c) (5 points) Can anyone misstate their preferences and get a better outcome? If so, who and how?

5. (10 points) What is a social choice function and what does it mean for a social choice function to be Pareto efficient? *Please answer in the space below (about two short paragraphs). Write as if you were explaining to someone who has never taken an economics course before.*

6. (10 points) Circle one choice below each statement. Your answer will only be used to help me improve this course and exam-writing for the rest of this semester and future offerings of this course. **Turn this page in separately from the rest of the exam. Do not write your name on it.** Please be honest.

I felt the learning objectives were clear.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I felt the homework exercises helped me prepare well for the exam.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I felt lecture helped me prepare well for the exam.

Strongly Disagree Disagree Neutral Agree Strongly Agree

I felt the *content* of the exam what similar to what I expected.

Strongly Disagree Disagree Neutral Agree Strongly Agree

Relative to my expectations, I felt the *difficulty* of the exam was:

Much Harder Harder As Expected Easier Much Easier

Additional comments that could help me improve this course?
(Feel free to use back if needed.)