Analytical Politics II

Solutions to **Midterm**

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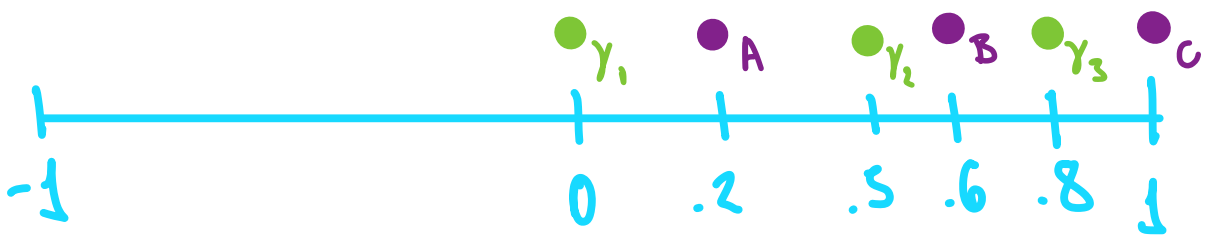
Problem 1: Setup

Three individuals, denoted A, B, and C, have preferences over policies $y \in [0, 1]$, given by the utility function:

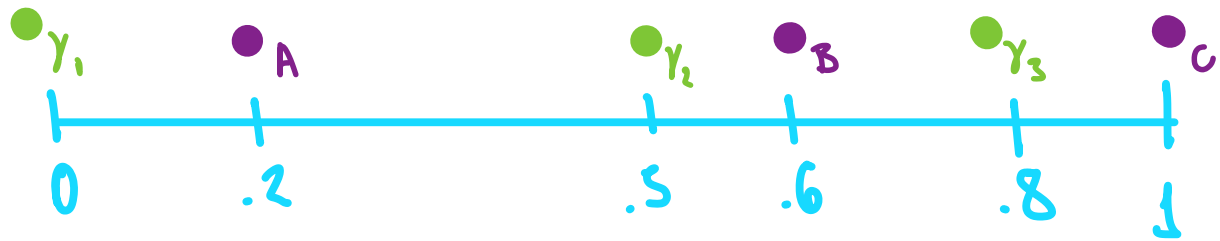
$$u_i(y) = -|x_i - y|.$$

The ideal points for these individuals are $x_A = 0.2$, $x_B = 0.6$, and $x_C = 1$. These individuals form a committee that must choose between the following three policy alternatives: $y_1 = 0$, $y_2 = 0.5$, and $y_3 = 0.8$.



Problem 1: a

Is there an alternative among y_1, y_2, y_3 that cannot be defeated in a pairwise-majority vote by any other alternative among y_1, y_2, y_3? If so, which policy?



$y_1 \times y_2 : y_2$

$y_1 \times y_3 : y_3$

$y_2 \times y_3 : y_2$

y_2 IS THE ONLY ONE THAT CANNOT BE DEFEATED.

Problem 1: a

Is there an alternative among y_1, y_2, y_3 that cannot be defeated in a pairwise-majority vote by any other alternative among y_1, y_2, y_3? If so, which policy?

Solution. When choosing between y_1 and y_2, a majority (consisting of individuals B, C) prefers y_2. When choosing between y_2 and y_3, a majority (consisting of individuals A, B) prefers y_2. Thus the Condorcet winner is y_2.

Problem 1: B(i)

$u_B(y_1) = |0.6 - 0| = 0.6$

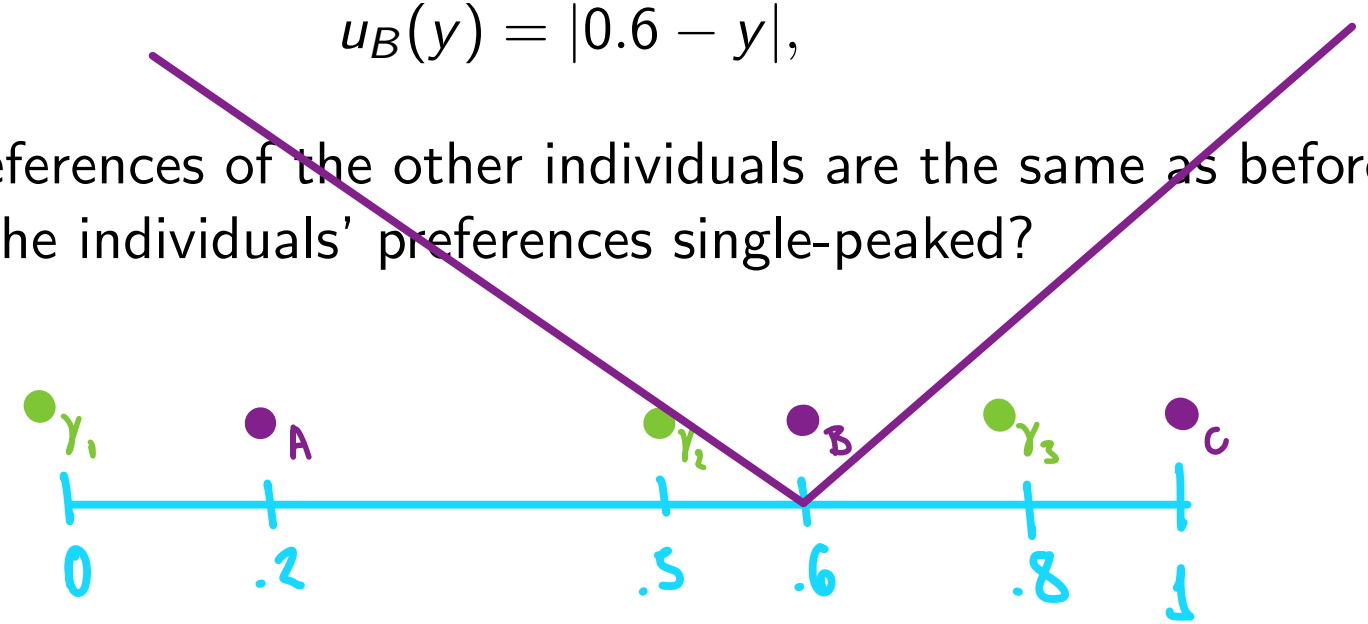
$u_B(y_2) = |0.6 - 0.5| = 0.1$

$u_B(y_3) = |0.6 - 0.8| = 0.2$

Suppose that individual B now has preferences over policies $y \in [0, 1]$ given by

$$u_B(y) = |0.6 - y|,$$

but the preferences of the other individuals are the same as before. Are all of the individuals' preferences single-peaked?



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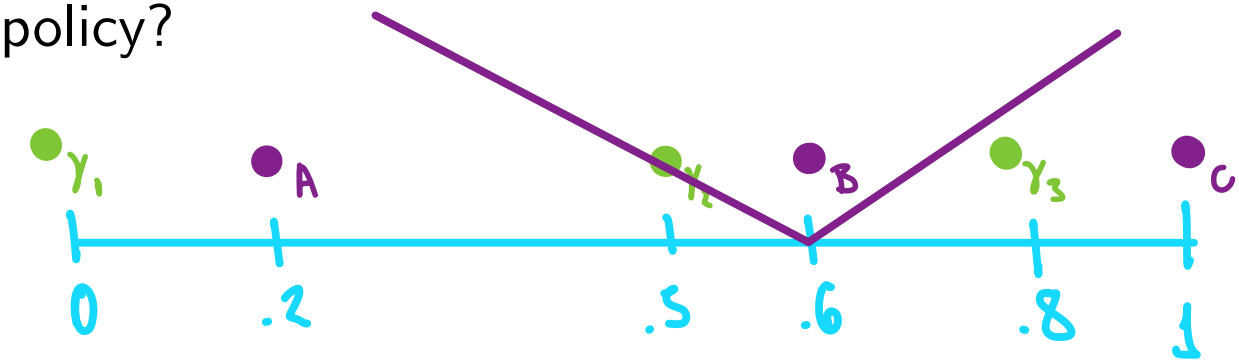
Solution. The preferences of individuals A, C are single-peaked, while the preferences of individual B are not. For individual B, $y_B = 0.6$ is no longer the ideal point, rather the least-preferred policy since u_B is now *increasing* in the distance from y_B.

Problem 1: B(ii)

Is there an alternative among y_1, y_2, y_3 that cannot be defeated in a pairwise-majority vote by any other alternative among y_1, y_2, y_3? If so, which policy?



$y_1 \times y_2 : y_1$

$y_1 \times y_3 : y_1$

$y_2 \times y_3 : y_2$

y_1 is the Condorcet winner now.

Problem 1: B(ii)

Is there an alternative among y_1, y_2, y_3 that cannot be defeated in a pairwise-majority vote by any other alternative among y_1, y_2, y_3? If so, which policy?

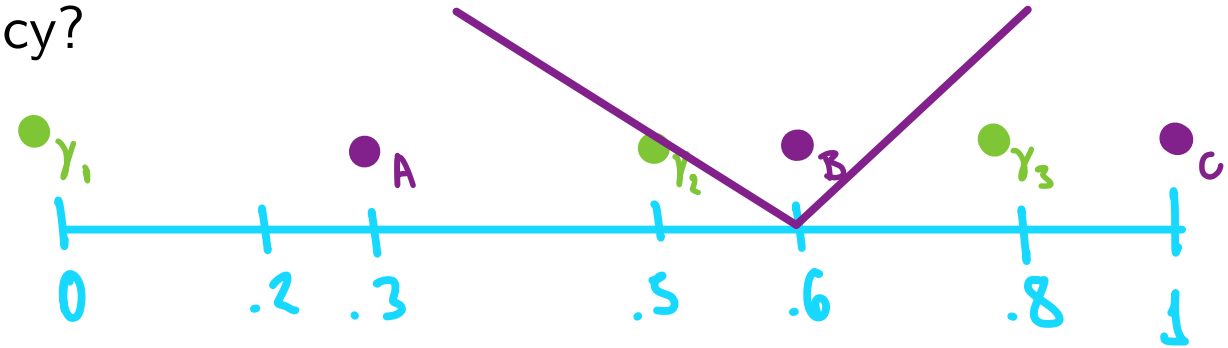
Solution. When choosing between y_1 and y_2, a majority (consisting of individuals A, B) prefers y_1. When choosing between y_1 and y_3, a majority (also consisting of individuals A, B) prefers y_1. Thus the Condorcet winner is now y_1.

Problem 1: B(iii)

Now suppose that individual A's ideal policy is $x_A = 0.3$ (in addition to the previous change in B's preferences). Hence, individual A has preferences over policies $y \in [0, 1]$ given by

$$u_A(y) = -|0.3 - y|,$$

Is there an alternative that cannot be defeated in pairwise majority rule? If so, which policy?



$y_1 \times y_2 : y_2$

$y_3 \times y_2 : y_1$

$y_2 \times y_3 : y_3$

} NO CONDORCET WINS.

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$$u_A(y) = -|0.3 - y|,$$

Is there an alternative that cannot be defeated in pairwise majority rule? If so, which policy?

Solution. When choosing between y_1 and y_2, a majority (consisting of individuals A, C) prefers y_2. When choosing between y_1 and y_3, a majority (consisting of individuals A, B) prefers y_1. When choosing between y_2 and y_3, a majority (consisting of individuals B, C) prefers y_3. Thus there is no Condorcet winner.

Problem 1: C

Is it necessary that all individuals have single-peaked preferences in order for a policy that cannot be defeated in pairwise majority winner (i.e., a Condorcet winner) to exist? Comment based on your previous answers.

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Solution. Part (b.iii) shows that in some cases the absence of single-peaked preferences (in this case for B) can cause a Condorcet winner not to exist. However, part (b.ii) shows that there are cases in which even without single-peaked preferences a Condorcet winner still exists. Hence, single-peaked preferences are not necessary for the existence of a Condorcet winner.

Problem 2: Setup

This question is based on Tables 1 and 2 from the paper by Gagliarducci, Nannicini, and Naticchioni (2011) covered in the lectures in week 4. These tables are reproduced below.

TABLE 1—PRETREATMENT CHARACTERISTICS BY ELECTORAL RULE

	Proportional	Majoritarian	Difference
Male	0.756	0.914	−0.158***
Age	48.566	48.248	0.318
Years of schooling	16.102	15.976	0.125
Different residence	0.094	0.033	0.061***
Local government experience	0.431	0.564	−0.133***
National politician	0.274	0.207	0.067***
Freshman	0.728	0.776	−0.048**
Incumbent	0.365	0.400	−0.034
Switching	0.299	0.101	0.198***
Center-right	0.383	0.405	−0.021
Parliament appointment	0.089	0.074	0.015
Clerk	0.051	0.051	0.000
Lawyer	0.119	0.135	−0.016
Executive	0.145	0.137	0.008
Politician	0.201	0.162	0.039*
Entrepreneur	0.086	0.100	−0.013
Teacher	0.109	0.090	0.019
Self employed	0.071	0.111	−0.040**
Physician	0.053	0.090	−0.036**
Observations	394	1,305	

Notes: Terms XII, XIII, and XIV; ministers excluded. All variables are dummies, except age and schooling (expressed in years). Different residence stands for living in a province different from the province of election. Local government experience stands for previous experience at the local level (e.g., mayor of a city or president of a regional government). Freshman means that the previous parliamentary experience is lower than a full term. Incumbent refers to politicians elected in the same district in the previous term. Switching stands for politicians elected in different tiers of the electoral system across the three legislative terms. Parliament appointment indicates that the politician has previously held some special Parliament appointment (e.g., president or vice-president of the Parliament or of a legislative committee). Job dummies refer to the (self-declared) preelection occupation.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Problem 2: Setup

TABLE 2—BILL SPONSORSHIP AND ABSENTEEISM RATE BY ELECTORAL RULE

	Proportional	Majoritarian	Difference
Bill sponsorship			
No. of bills	8.025	8.489	−0.464
No. of bills (first year)	3.754	4.038	−0.284
No. of bills (last year)	1.320	1.404	−0.084
Share of targeted bills	0.073	0.113	−0.040***
Share of targeted bills (first year)	0.054	0.090	−0.035***
Share of targeted bills (last year)	0.042	0.058	−0.016
Observations	394	1,305	
Absenteeism rate			
Absenteeism rate	0.366	0.309	0.057***
Observations	368	1,260	
Absenteeism rate (first year)	0.351	0.273	0.078***
Absenteeism rate (last year)	0.295	0.238	0.056***
Observations	234	828	

Notes: Terms XII, XIII, and XIV; ministers excluded. No. of bills is the total number of bills presented as main sponsor (over the term, in the first year, and in the last year, respectively). Share of targeted bills is the fraction of bills targeted at the region of election (over the term, in the first year, and in the last year, respectively). Absenteeism rate is the percentage of electronic votes missed without any legitimate reason (over the term, in the first year, and in the last year, respectively). Yearly observations on the absenteeism rate are only available for the XIII and XIV terms.

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Problem 2: A

What does **Table 1** show? Explain what is the information contained in the table and provide an intuitive explanation of the findings for at least three of the statistically significant differences shown in the rightmost column.

Problem 2: A

[VISUAL DESCRIPTION OF THE TABLE]

What does **Table 1** show? Explain what is the information contained in the table and provide an intuitive explanation of the findings for at least three of the statistically significant differences shown in the rightmost column.

Solution. Table 1 compares individuals elected under a proportional system to individuals elected under a majoritarian system on pre-treatment characteristics. It shows that there statistically significant differences between these types of candidates. The implication of this is that if we simply compare majoritarian-elected politicians to proportional-elected politicians, the differences we observe might be due to these differences. The authors hypothesize that individuals with strong local ties might be more likely to run in majoritarian districts, and in turn may carry out more targeted policies. This seems in line with the data in Table 1 since majoritarian-elected politicians are more likely to have local government experience and are less likely to live in another province

Problem 2: A [GENERAL STATS KNOWLEDGE]

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Problem 2: A [SOMEWHAT INTUITIVE INTERPRETATION]

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Problem 2: B

What does **Table 2** show? Explain what is the information contained in the table and provide an intuitive explanation for the findings on targeted bills and absenteeism.

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What does **Table 2** show? Explain what is the information contained in the table and provide an intuitive explanation for the findings on targeted bills and absenteeism.

Solution. Table 2 provides descriptive statistics comparing proportional and majoritarian representatives on their absenteeism rates and bill sponsorship. In particular, majoritarian politicians had a higher share of targeted bills than proportional representatives, and they had a relatively lower absenteeism rate. One explanation for the targeted bills result is that because majoritarian representatives have a closer tie to their district, as shown in table 1, they direct more bills towards their district. One explanation for the absenteeism result is that proportional representatives are more likely to be women

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Problem 2: C

Based on the evidence in **Table 1**, do the results in **Table 2** support a valid causal relationship between electoral systems and performance? Explain.

Solution. No, based on Table 1, the results in Table 2 do not support a valid causal relationship between electoral systems and performance. In particular, the results in Table 2 "describe the joint impact of the causal relationship, selection on observables, and unobservable self-selection." So while there might be a causal effect, we cannot determine what that is based on the simple comparison in Table 2.

Proble 3: Setup

The following set-up corresponds exactly to the model of accountability covered in class in week 3. Below is a summary. This is a two-period model involving a voter and a set of politicians. The ability of each politician is a random variable that takes two possible values: it is high (H) with probability $\gamma \in (0, 1)$ and low (L) with complementary probability $1 - \gamma$. Each politician knows their own ability, but the voter does not know it. Each period, the politician in office chooses how much effort to put into public administration. Effort e_t is unobservable to the voter and ranges from zero to one.

Problem 3: Setup

The policy outcome can either be good or bad. High-ability politicians always achieve the good outcome. Low-ability politicians achieve the good outcome with probability equal to their effort level. After the first period, the voter observes the policy outcome and decides whether to replace the incumbent with a random opponent drawn from the population of politicians. The voter only cares about the policy outcome and prefers a good one to a bad one. Politicians receive a benefit $B > 0$ if they win an election. Politicians also dislike effort, with its cost given by the function e_t^2.

Problem 3: A

How much effort will the winner of the election exert in period 2? Why?

Problem 3: A

How much effort will the winner of the election exert in period 2? Why? **[2 points]**

Solution. Effort in period 2 will be zero in equilibrium, as there are no re-election incentives and effort is costly.

Problem 3: B

The voter will definitely not re-elect the incumbent if the policy outcome was bad in the first period. Explain the intuition behind this result.

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Solution. The voter, who wants a good outcome, prefers a high-ability politician who always produces good policy. If the policy in period 1 is bad, the incumbent is surely low-ability; given that the challenger may be high-ability, the voter prefers to elect the challenger than re-elect the incumbent.

Problem 3: C

For the remainder of the question, you can assume that the incumbent is re-elected only if the policy outcome in period 1 is good.
Show that the optimal first-period effort for a low-quality incumbent is equal to $e_1 = B/2$.

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Solution. Utility is $e_1 B - e_1^2$; it is maximized by taking the FOC with respect to e_1 which yields $e_1^* = \frac{B}{2}$.
Technically, since $e_1^* \in [0, 1]$, the fully correct answer is that $e_1^* = \frac{B}{2}$
$\min\left\{\frac{B}{2}, 0\right\} because when B is sufficiently large (larger than 2), e_1^* = 1.$
But a student does not need to write this to get full points.

Problem 3: D

In the context of the model, what do we mean when we say that elections allow us to solve the moral hazard problem at the expense of aggravating the adverse selection problem? Explain.

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In the context of the model, what do we mean when we say that elections allow us to solve the moral hazard problem at the expense of aggravating the adverse selection problem? Explain. **[2 points]**

Solution. Adverse selection is the problem that candidates' ability is unobservable. Hence, even though the voter would always prefer high ability candidate, he may be unable to do so. Moral hazard refers to the problem that the candidates effort is unobservable. Hence, even though the voter would prefer the low ability candidate to exert maximum effort ($e_2 = 1$), this is not enforceable. Elections allow the voter to extract effort from the low ability politician who wants to be re-elected, thereby helping solve the moral hazard problem. However, the more effort the low quality candidate exerts, the more likely the outcome will be good and he will be re-elected. As a result, the adverse selection problem is now aggravated, as the voter is less likely to detect the low quality politician and get rid of him.

Problem 3: E

Suppose now that the voter is imperfectly informed about the policy outcome. She can perfectly detect if the outcome was bad, but may fail to recognize a good outcome. In particular, with a probability $\theta \in (0, 1)$ she will think that the outcome was bad when in fact it was good. Show that the optimal first-period effort for a low-quality incumbent is now equal to $e_1 = \frac{B(1-\theta)}{2}$. How does your answer compare to the one in part (c)? Explain the intuition behind the differences in effort.

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Solution. The probability that the voter correctly observes a good outcome is $1-\theta$, thus politician's utility in period 1 is $(1-\theta)e_1 B - e_1^2$. The FOC yields $e_1^* = \frac{B(1-\theta)}{2} < \frac{B}{2}$. Since $1-\theta < 1$, effort in the new equilibrium is lower. With imperfect information, the marginal benefit from an extra unit of effort is smaller, which dissuades the incumbent from working as hard as before. However, since $e_1^* \in [0,1]$, the fully correct answer is that $e_1^* = \min\{\frac{B(1-\theta)}{2}, 0\}$. But a student did not need to write this to get full credit.