Part I.
    (a) Pure strategy Nash equilibrium: (High, Left)

    (b) _ For player 1, High is weakly dominated by Bottom
        _ For player 2, Left is strongly dominated by Right
        _ For player 1, Top is strongly dominated by Low

    (c) The reduced game looks like:

		Player 2 Middle $[q]$	Player 2 Right $[1-q]$
Player1	Low $[p]$	6 , 5	13 , 4
	Bottom $[1-p]$	7 , 6	10 , 8

Suppose Player 1 plays Low with probability p and plays Bottom with $1\text{-}p$, and Player 2 plays Middle with probability q and plays Right with $1\text{-}q$.

For player 1,
The expected utility of playing Low is:
$6q + 13(1-q)$
The expected utility of playing Bottom is:
$7q + 10(1-q)$

$6q + 13(1-q) = 7q + 10(1-q)$
$\therefore q = 3/4$

For player 2,
The expected utility of playing Middle is:
$5p + 6(1-p)$
The expected utility of playing Right is:
$4p + 8(1-p)$

$5p + 6(1-p) = 4p + 8(1-p)$
$\therefore p = 2/3$

MSNE = (Player 1 plays Low with probability of 2/3 and plays Bottom with probability of 1/3, Player 2 plays Middle with probability of 3/4 and plays Right with probability of 1/4)

Part II.

About the 2000 Primaries in the Democratic party

In the wake of the presidential election of 2000, the Democratic Party held primary elections to select it candidate for the general election. In these primaries, Al Gore (then vice-president) ran against Bill Bradley. Running for primaries can be a costly process so candidates have to decide whether they will go fundraising or not.

Both candidates would rather win the primaries without fundraising as fundraising is time-consuming and unrewarding.

Assume that if one candidate fundraises and the other does not, the candidate that raised funds wins the primaries (he can afford more commercials,...).

If they both fundraise or if they both not fundraise, assume that Gore wins (as he has better name recognition,...).

Furthermore, assume that they both want to win.

(A) What are the different outcomes? Give a payoff that is consistent with the desciption of the situation for each player for each outcome (2 pts).

There are 4 outcomes depending on what candidates do
(Gore,Bradley)-> { (RF,RF); (RF,N);(N,RF);(N,N)}
The payoffs can be summed up in a table

Bradley / Gore	Raise Funds	Do Not raise funds
Raise Funds	**Gore Wins (4,-1)**	Gore Wins (4,0)
do Not raise funds	Bradley Wins (0,5)	Gore Wins (10,0)

Notice that loosing without fundraising is better than loosing after fundraising (since "fundraising is time-consuming and unrewarding").
Also wining without fundraising is better than wining after fundraising for Gore (for the same reason).
The payoffs in the table are just examples but their ordering is important.

(B) Assume that Gore gets to decide whether to fundraise or not first. Fill up the tree below (1 pt) and find the equilibrium using backward induction (you can draw the equilibrium on the tree or write it below the tree) (3pts). Describe the outcome (1 pt).

```
                        GORE
          RF                        NOT
      BRADLEY                    BRADLEY
    RF       NOT              RF        NOT
  (4,-1)    (4,0)          (0,5)       (10,0)
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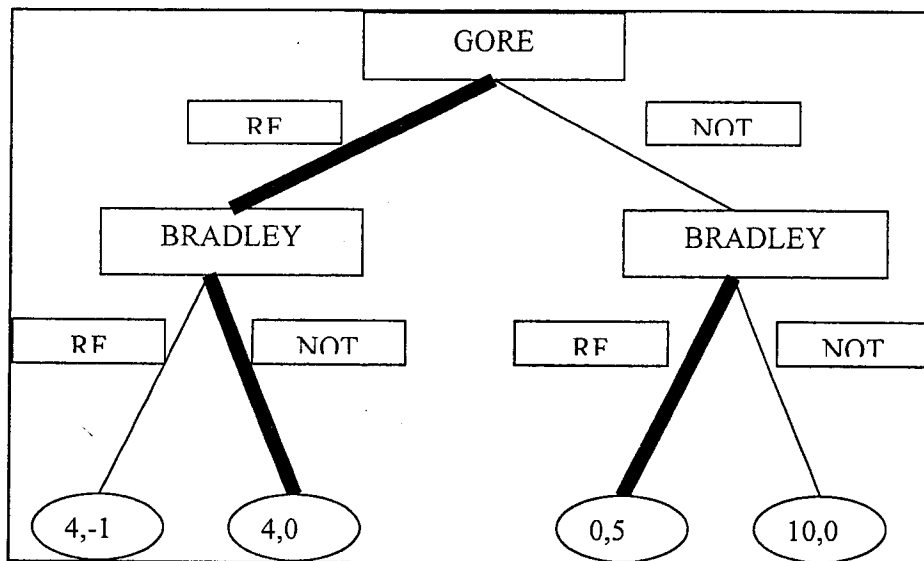
The equilibrium is (RF; NOT,RF)
The outcome is that Gore raises funds, Bradley doesn't, Gore wins

(C) Now assume that Bradley gets to decide whether to fundraise or not first. Fill up the tree below (1 pt) and find the equilibrium using backward induction (you can draw the equilibrium on the tree or write it below the tree)(3 pts). Describe the differences in outcome if any (1 pt).

In here the equilibrium is (NOT; RF,NOT)
The outcome is that Gore wins after none of the candidates went fundraising.
The Difference is that Gore does not have to fundraise to be sure to win (in the previous question, he was sure to win if he raised funds and sure to loose if he did not, in here he is sure to win anyways so he "saves the trouble").


```
                      BRADLEY
          RF                        NOT
       GORE                        GORE
    RF      NOT              RF        NOT
 (-1,4)    (5,0)          (0,4)       (0,10)
```

Part III.

a)

                                        House

                    Propose   Not

            President

                                                        SQ, SQ (0,10)

                Veto   Sign

        House

                                        NTB, NTB (5, 5)

    Override   Accept

RTB, RTB (10, 0)   SQ, SQ (0,10)
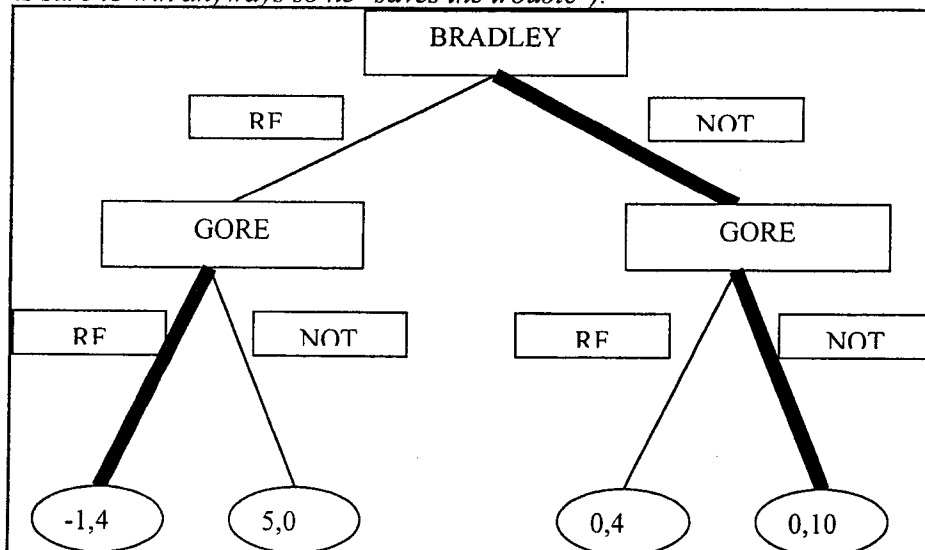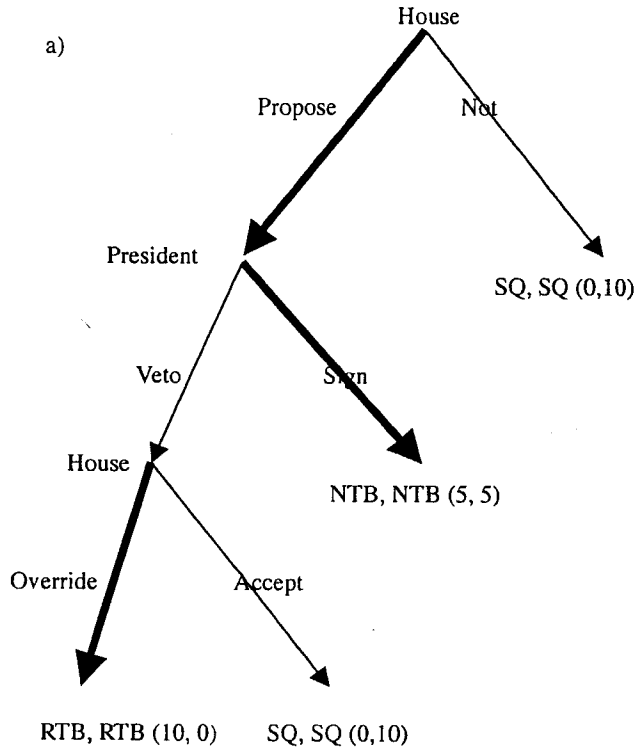
In the extensive form game, you can assign your own number for payoffs, if your number is consistent with the description of preference ranking.

Subgame Perfect NE (House Propose/Override, President Sign)

b)

President

House		Veto	Sign
	Propose Override	RTB*, RTB (10, 0)	NTB*, NTB+ (5, 5)
	Propose Accept	SQ, SQ+ (0, 10)	NTB*, NTB (5, 5)
	Not Override	SQ, SQ+ (0, 10)	SQ, SQ+ (0, 10)
	Not Accept	SQ, SQ+ (0, 10)	SQ, SQ+ (0, 10)

Pure Strategy NE (House Propose/Override, President Sign)

Part IV.

	Monday Boyfriend	Tuesday Girlfriend	Wednesday Boyfriend	Thursday Girlfriend	Friday Boyfriend	Saturday Girlfriend	
	C	c	C	c	C	c	(35,25)
	D	d	D	d	D	d	
	(5,-5)	(0,10)	(15, 5)	(10,20)	(25,15)	(20,30)	

	Monday Boyfriend	Tuesday Girlfriend	Wednesday Boyfriend	Thursday Girlfriend	Friday Boyfriend	Saturday Girlfriend	
	C	c	C	c	C	c	(35,25)
	D	d	D	d	D	d	
	(5,-5)	(0,10)	(15, 5)	(10,20)	(25,15)	(20,30)	
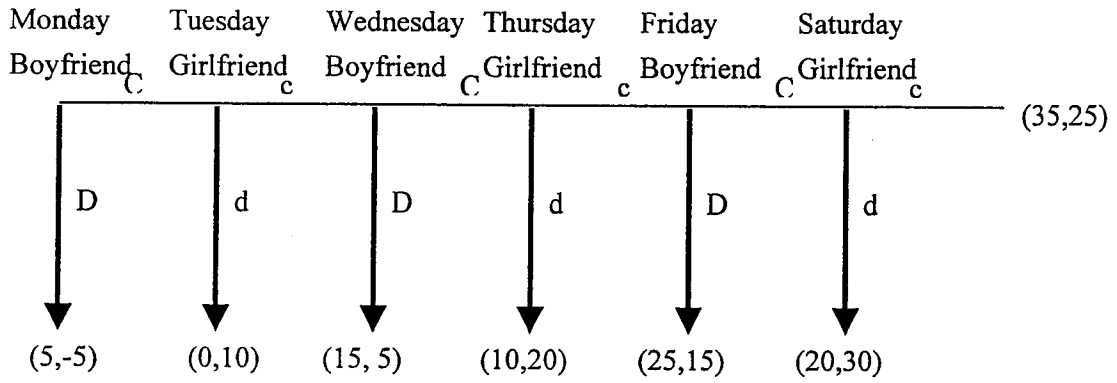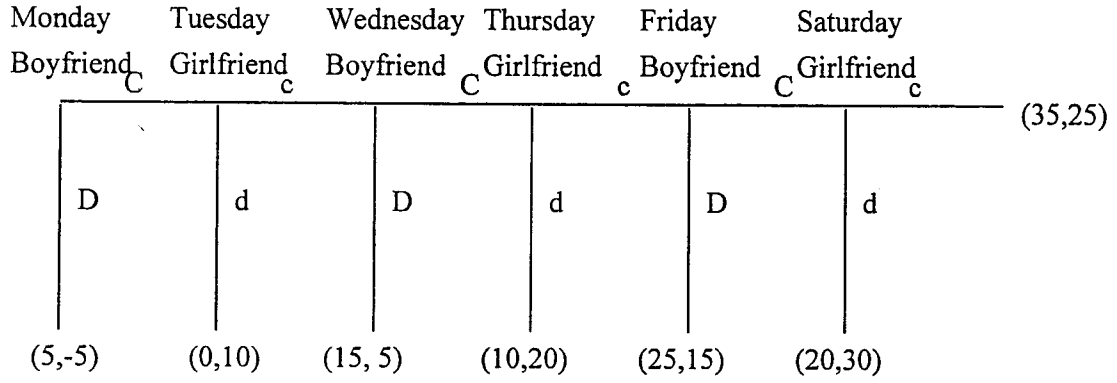
GIRLFRIEND

		ccc	ccd	cdc	cdd	dcc	dcd	ddc	ddd
	CCC	35,25	20,30	10,20	10,20	0,10	0,10	0,10	0,10
	CCD	25,15	25,15	10,20	10,20	0,10	0,10	0,10	0,10
B CDC		15,5	15,5	15,5	15,5	0,10	0,10	0,10	0,10
O **Y** **F** CDD		15,5	15,5	15,5	15,5	0,10	0,10	0,10	0,10
R **I** **E** DCC		5,-5	5,-5	5,-5	5,-5	**5,-5**	**5,-5**	**5,-5**	**5,-5**
N **D** DCD		5,-5	5,-5	5,-5	5,-5	**5,-5**	**5,-5**	**5,-5**	**5,-5**
	DDC	5,-5	5,-5	5,-5	5,-5	**5,-5**	**5,-5**	**5,-5**	**5,-5**
	DDD	5,-5	5,-5	5,-5	5,-5	**5,-5**	**5,-5**	**5,-5**	**5,-5**

midterm score	rank	percentile
48	1	100.0
48	2	99.3
48	3	98.7
48	4	98.0
47	5	97.4
47	6	96.7
47	7	96.0
47	8	95.4
47	9	94.7
46	10	94.0
46	11	93.4
46	12	92.7
46	13	92.1
46	14	91.4
46	15	90.7
45	16	90.1
45	17	89.4
45	18	88.7
45	19	88.1
45	20	87.4
45	21	86.8
45	22	86.1
44	23	85.4
44	24	84.8
44	25	84.1
44	26	83.4
44	27	82.8
43	28	82.1
43	29	81.5
43	30	80.8
43	31	80.1
42	32	79.5
42	33	78.8
42	34	78.1
42	35	77.5
41	36	76.8
40	37	76.2
40	38	75.5
40	39	74.8
40	40	74.2
39	41	73.5
39	42	72.8
39	43	72.2
39	44	71.5
39	45	70.9
39	46	70.2
39	47	69.5
39	48	68.9
39	49	68.2
38	50	67.5
38	51	66.9
38	52	66.2
38	53	65.6
38	54	64.9
37	55	64.2
37	56	63.6
37	57	62.9
37	58	62.3
37	59	61.6
36	60	60.9

36	61	60.3
35	62	59.6
35	63	58.9
35	64	58.3
34	65	57.6
34	66	57.0
34	67	56.3
34	68	55.6
33.5	69	55.0
33	70	54.3
33	71	53.6
33	72	53.0
33	73	52.3
33	74	51.7
33	75	51.0
33	76	50.3
32	77	49.7
32	78	49.0
32	79	48.3
32	80	47.7
32	81	47.0
31	82	46.4
31	83	45.7
31	84	45.0
31	85	44.4
31	86	43.7
31	87	43.0
30	88	42.4
30	89	41.7
30	90	41.1
30	91	40.4
30	92	39.7
29	93	39.1
29	94	38.4
29	95	37.7
28	96	37.1
28	97	36.4
28	98	35.8
28	99	35.1
28	100	34.4
28	101	33.8
27	102	33.1
27	103	32.5
27	104	31.8
27	105	31.1
27	106	30.5
27	107	29.8
26	108	29.1
26	109	28.5
26	110	27.8
26	111	27.2
26	112	26.5
25	113	25.8
25	114	25.2
25	115	24.5
25	116	23.8
25	117	23.2
24	118	22.5
24	119	21.9
24	120	21.2
24	121	20.5

24	122	19.9
24	123	19.2
23	124	18.5
23	125	17.9
23	126	17.2
22	127	16.6
21	128	15.9
21	129	15.2
21	130	14.6
21	131	13.9
20	132	13.2
20	133	12.6
20	134	11.9
20	135	11.3
19	136	10.6
19	137	9.9
19	138	9.3
18	139	8.6
18	140	7.9
17	141	7.3
17	142	6.6
15	143	6.0
13	144	5.3
11	145	4.6
11	146	4.0
10	147	3.3
10	148	2.6
8	149	2.0
7	150	1.3
6	151	0.7