Quiz #4

Problem 1 For problem 3, consider the following two games:

Bear 1		Bear 2 Hawk	dove
	Hawk	-5,-5	15,-1
	Dove	-1,15	6,6

US		Japan Low tarriff	High tarriff
	Low tarriff	5,5	2,9
	High tarriff	4,-4	3,-1

a. In the game with the two bears, what are the pure-strategy Nash equilibria?

Dove, Hawk and Hawk, Dove

b. There is also a mixed-strategy Nash equilibrium in the bear game. Write down the equations that describe it (to save time, you need not actually solve for it).

$-5p+15(1-p) = -p+6(1-p)$ and $-5q+15(1-q) = -1q+6(1-q)$, p is Bear 1's probability of Hawk, q is ear 2's probability of Hawk.

c. In the game between the US and Japan, what are the pure strategy Nash equilibria?

High tariff, high tariff

d. Does this second game have any mixed-strategy Nash equilibria?

No, as 'low tariff' is a dominated strategy for Japan, it can never be indifferent over its two strategies.

Problem 2 A town has 100 voters: 51 conservatives and 49 liberals. A conservative and a liberal candidate are running for mayor. Voting is by simple majority, and in the case of a tie assume the liberal candidate wins. A conservative gets a payoff of 10 if the conservative candidate is elected, and -10 if the liberal is elected; vice versa for a liberal voter. It costs a citizen 1 to vote.

a. Explain why it is not a Nash equilibrium for nobody to vote.

If no one votes, any one conservative can increase his payoff from -10 to 9 by voting.

b. Is it a Nash equilibrium for 50 conservatives and 49 liberals to vote?

No, as any one liberal can increase his payoff from -11 to -10 by staying home, as not voting will not change the outcome of the election.

Problem 3 Two bills are being considered in Congress (bill A and bill B). Here are the payoffs to Congress and the president depending upon which laws are passed:

| Outcome	Congress	President
Bill A only	4	1
Bill B only	1	4
Both bills	3	3
Neither bill	2	2

a. Suppose that Congress first decides which of the four options to select. The president can then either sign or *veto*, in which case no law is passed. Which bills become laws in the subgame perfect equilibrium of this game?

Both bills are passed

b. Now suppose that the president has a *line-item veto*, so that if Congress passes both bills, he can choose to sign bill A or bill B only. However, he cannot enact laws that Congress does not pass. Which bills become laws in the subgame perfect equilibrium of this game?

Neither bill is passed

Problem 4 Consider the game below.
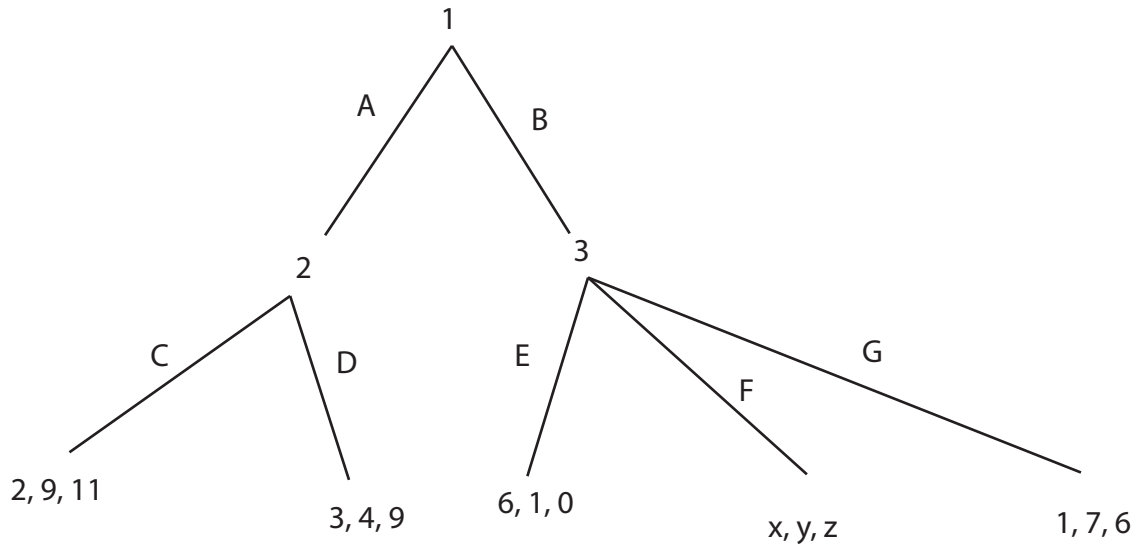
a. What must be true of x, y, and z for outcome F to be played in an equilibrium of this game? (Your answer should be of the form "x can be anything, y must be less than -17, and z must be a prime number")

This requires z be at least 6, x be at least 2. y can be anything.

b. Suppose $z = 5$ and $x = y = 20$. What is the subgame perfect equilibrium of this game?

1 plays A, 2 plays C.