Final Exam Answers: Economics 101

1. Normal Form Games (note that a complete answer must include a drawing of the socially feasible sets)

a)

	L	R
U	3*,2*	1,0
D	0,1	2*,3*

Two pure strategy equilibria as marked. Mixed for player 2 $3p+1-p=2(1-p)$ so p=1/4; for player 1 $2q+1-q=3(1-q)$ so q=1/2. Pure strategy equilibria are Pareto Efficient. The mixed equilibrium is not. No weakly dominated strategies.

b)

	L	R
U	-1,2	2,-1
D	2,-1	-1,2

Unique pareto efficient mixed equilibrium where both players mix 50-50. No weakly dominated strategies. Note that the socially feasible set is one-dimensional.

c)

	L	R
U	6,6	2,8*
D	8*,2	3*,3*

Unique Nash equilibrium (U,L are strictly dominated). No mixed equilibria. Nash equilibrium is not pareto efficient.

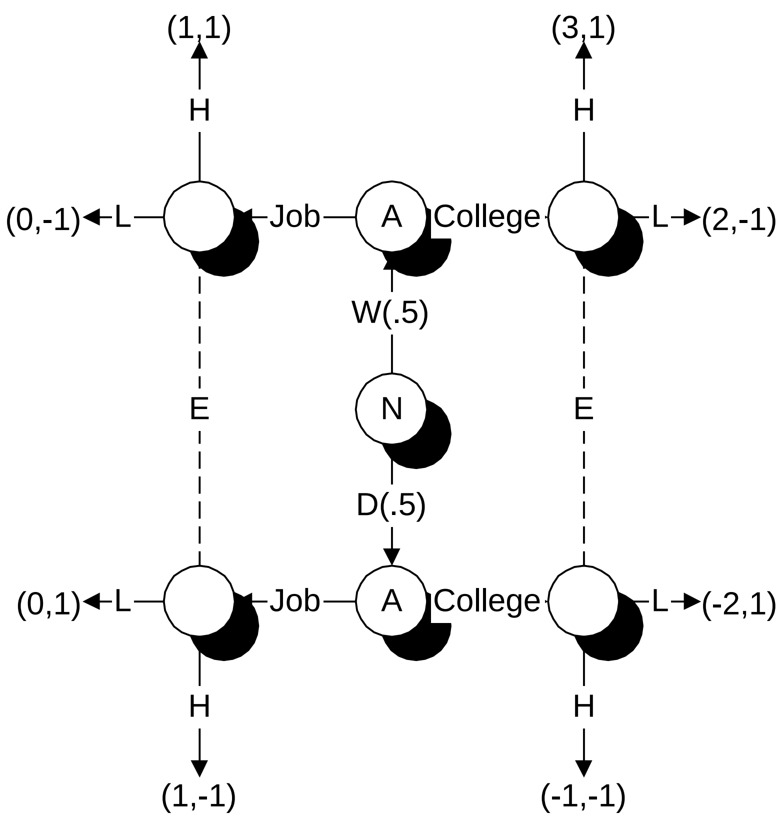
2. Long Run versus Short Run

	L	R
U	2,2*	0,0
D	4*,0	1*,1*

The unique Nash equilibrium is DR; the Stackelberg equilibrium is UL. Strategies for which lead to playing UL are UL if always UL in the past and DR if ever a deviation. Alternatively, players may base their strategies on past play of the LR player only: LR: U if U in the past and D if ever a deviation by LR and SR: L if U in the past and R if ever a deviation of the LR player.

These are optimal for the short-run player because it is in his best-response correspondence. For the long run player it must be that $2 \geq (1-\delta)4+\delta 1$ or $\delta \geq 2/3$.

3. Screening



S/D (J/C)	HH	HL	LH	LL
CC	1,0*	0,0*	1,0*	0,0*
CJ	2*,0	3/2*,-1	3/2*,1*	1*,0
JC	0,0	-1/2,1*	-1/2,-1	-1,0
JJ	1,0*	1,0*	0,0*	0,0*

Unique Nash equilibrium: Smart->College, Dumb->Job; low wage to non-college; high wage to college

4. Decision Analysis

C = has cancer

P = test indicates cancer

$$\Pr(C|P) = \frac{\Pr(P|C)\Pr(C)}{\Pr(P|C)\Pr(C) + \Pr(P|\sim C)\Pr(\sim C)} = \frac{.95\times.2}{.95\times.2+.05\times.8} \approx .83$$

with the operation utility is $.83\times 0 + .17\times(-50) = -8.5$

without the operation utility is $.83\times(-100) + .17\times(10) = -81.3$

So have the operation

5. Cournot with Uncertain Cost

$$\pi_i(x_i, c_i) = (2/3)\left[17 - c_i - (x_i + x^1)\right]x_i$$
$$+(1/3)\left[17 - c_i - (x_i + x^3)\right]x_i$$

maximize

$$\frac{d\pi_i(x_i,c_i)}{dx_i} = \left[17 - c_i - (2x_i + (2/3)x^1 + (1/3)x^3)\right] = 0$$

so $2x_i = (17 - c_i - (2/3)x^1 - (1/3)x^3)$

$2x_i = (17 - c_i - (2/3)x^1 - (1/3)x^3)$

solve each equation individually

$8x^1 = 48 - x^3$

$7x^3 = 42 - 2x^1$ or $x^3 = 6 - 2x^1 / 7$

plug the second into the first

$8x^1 = 48 - (6 - 2x^1 / 7) = 36 + 2x^1 / 7$ or $x^1 = 49/9$

substitute back to get $x^3 = 40/9$