Grading scheme for Final I, Nov 20, 2012:

Question 1: 6 marks

- 2 marks for realizing that A is a good strategy, because the payoff of A against itself is higher than the payoff of any other strategy against A (i.e., A is an ESS).
- 2 marks for realizing that C is a good strategy, because the payoff of C against itself is higher than the payoff of any other strategy against C (i.e., C is an ESS)
- 2 marks for realizing that A and C are the only good strategies.

Question 2: 6 marks

- 2 marks for realizing that the fitness of C is -4*p+5*(1-p)
- 2 marks for realizing that the fitness of D is 1*p+1*(1-p)
- 2 marks for finding the replicator equation dp/dt=p(1-p)(-9p+4)

Question 3: 6 marks

- 3 marks for finding the the equilibrium points 0,1, and 4/9.
- 3 marks for finding the stabilities of these equilibria: 0=unstable, 4/9=stable, 1=unstable.

Question 4: 6 marks

- 2 marks for explaining that the equilibrium points are found by setting the right hand sides of the systems of differential equations to 0.
- 2 marks for finding the x-coordinate of the equilibrium, a+b.
- 2 marks for finding the y-coordinate of the equilibrium, a/(a+b)^2.

Question 5: 6 marks

- 3 marks for correctly discussing case i): stable equilibrium dynamics.
- 3 marks for correctly discussing case ii): unstable equilibrium, sustained oscillations.

Question 6: 6 marks

- 2 marks for writing down the differential equation dx/dt=k1*a*x-k2*x*y^2.
- 2 marks for writing down the differential equation dy/dt=k2*x*y^2-b*y.
- 2 marks for finding the equilibrium points (0,0) and (b/\sqrt{k1*k2*a},\sqrt{k1*a/k2}).

Question 7: 6 marks

- 2 marks for explaining that the first bifurcation diagram contains 2 period-doubling routes to chaos (one when moving from the middle of the horizontal to the right, and one when moving from the middle to the left).

- 2 marks for explaining that the second bifurcation diagram does not show a period-doubling route to chaos.
- 2 marks for explaining that the third bifurcation diagram shows three period-doubling routes to chaos (one moving from left to right starting at ca. b=0.1, one moving from right to left starting at ca. b=0.35, and one moving from right to left starting at ca. b=1.4).