Ec 172C – OPERATIONS RESEARCH Foster, UCSD, Friday, 28 OCT 2005

MIDTERM EXAM

Open notes; calculator ok. Put answers in space provided. **SHOW WORK** for partial credit and to avoid allegations of cheating. Carry 3+ decimal places in calculations. Point values of questions in **[bold brackets]**.

Problem 1

Figure 1 shows a telegraph network c. 1900. Numbers on arcs represent bi-directional flow capacities (word groups/hour). A budding wire service wants to maximize the number of groups that can be sent from Chicago to Omaha. **[18,4,3]**

Table 1 – Arc Flows	Flow
Minn. To Sioux Falls	
Chicago to Kansas City	
Lincoln to Omaha	

- Find the maximum. **Max Flow = _____ groups/hour**
- Draw the minimum cut on the diagram in Figure 1.
- Record arc flows listed in Table 1. Answers must match work shown in worksheet below.



Route	Flow	Total

Pr 1 _____ 25 Pr 2 _____ 25 /50

Name: _

c. ____ ID: _

Problem 2

The Cozumel Relief Authority has 4 work teams which can each be assigned to one of three preparedness activities. Lives saved in the event of storm disruption as a function of teams assigned to activities are in Table 2. Find (and record in Table 3) an assignment of teams to activities to maximize total potential lives saved. **[25]**

Table 2	Food/Water	Medical	Evacuation
Teams	Storage	Facilities	Vehicles
0	200	50	80
1	300	210	120
2	380	360	320
3	410	390	450
4	415	400	475

EVAC.	$V(s_3,d_3) = f(s_3,d_3) + V^*(s_4)$				Maximum		
$\{s_3\} D\{s_3\}$	0	1	2	3	4	V*(s ₃)	d ₃ *

MED.	$V(s_2,d_2) = f(s_2,d_2) + V^*(s_3)$				Maximum		
$\{s_2\} D\{s_2\}$	0	1	2	3	4	V*(s ₂)	D_2^*

FOOD	$V(s_1,d_1) = f(s_1,d_1) + V^*(s_2)$				Maxi	mum	
$\{s_1\} D\{s_1\}$	0	1	2	3	4	V*(s ₁)	D_1*

Table 3 Results					
Lives saved =	Food/Water	Med. Fac.	Evac. Veh.		
Teams Assigned					