SOLUTIONS TO MIDTERM EXAM 2

1.a. (10 pts.)

There is no absolute dominance among these four sites.

1.b. (10 pts.)

Rank the sites by construction cost (1st priority):

Site 3 ($10) P Site 1 ($12) P Site 4 ($14) P Site 2 ($15).

Since there are no ties in the most important attribute, the ranking is ready.

1.c. (15 pts.)

Site 1: Cost 12 ≤ 14, Highway Prox. 8 ≥ 7, Stability 6 = 6 → Acceptable

Site 2: Cost 15 > 14 → Unacceptable

Site 3: Highway Prox. 5 < 7 → Unacceptable

Site 4: Cost 14 = 14, Highway Prox. 8 ≥ 7, Stability 7 ≥ 6 → Acceptable

Sites 1 and 4 are acceptable

2.a. (25 pts.)

Linear Normalization and Global Scores

	Energy Savings	Initial Investment	Global Scores
w	0.6	0.4	
Project 1	50/75 = 0.6667	200/200 = 1	0.8
Project 2	75/75 = 1	200/350 = 0.5714	0.8286
Project 3	60/75 = 0.8	200/250 = 0.8	0.8

Project 2 is recommended

2.b. (10 pts.)

$w_{ES} = 0.8 \rightarrow w_{II} = 0.2$

	Energy Savings	Initial Investment	Global Scores
w	0.8	0.2	
Project 1	0.6667	1	0.7333
Project 2	1	0.5714	0.9143
Project 3	0.8	0.8	0.8

Project 2 is recommended (recommendation becomes stronger)

3. (30 pts.)

Vector Normalization

SQRT(90^2 + 70^2 + 85^2) = 142.2146

SQRT(500^2 + 400^2 + 450^2) = 782.6238

	Quality Score	Unit Price
Supplier 1	90/142.2146 = 0.6328	500/782.6238 = 0.6389
Supplier 2	70/142.2146 = 0.4922	400/782.6238 = 0.5111
Supplier 3	85/142.2146 = 0.5977	450/782.6238 = 0.5750

Weighted Normalized Ratings and Ideal Solutions

	Quality Score	Unit Price
Supplier 1	0.4430	0.1917
Supplier 2	0.3445	0.1533
Supplier 3	0.4184	0.1725
A*	0.4430	0.1533
A⁻	0.3445	0.1917

Separation Measures

	S*	S⁻	C*
Supplier 1	0.0383	0.0984	0.7197
Supplier 2	0.0984	0.0383	0.2803
Supplier 3	0.0312	0.0763	0.7098

Supplier 1 is recommended