Homework 9 – Assigned: March 18, 2026, Due: March 25, 2026

Risk Aversion and Construction Contracting

Two Contractors, I and III, each estimate that a project has the following cost probabilities:

Cost	P(Cost)
$800k	0.0833
900	0.1667
1000	0.5000
1100	0.1667
1200	0.0833

The utility curves for profit for Contractors I and III are shown on a page below.

(a) What would each contractor ask as a lump-sum price in order to receive an expected profit equal to 10% of expected cost?
Note: profit = lump sum price – cost.
(This question has nothing to do with utilities.)

(b) What is the utility of each contractor of receiving with certainty a profit equal to 10% of the expected cost?

(c) What is the expected utility to each contractor if he signs a lump-sum contract for the amount found in (a)? Compare this to the answer of (b).

(d) What is each contractor's expected utility of accepting a contract at "cost plus 10%fee"? Would each contractor prefer to take the contract at "cost plus 10%fee"?
Note: profit = fee = 10% of cost.

(e) For each contractor find the fee percentage z% that would make him indifferent between a contract for "cost plus z%fee" and a contract written for the lump-sum price in (a).

(f) What would each contractor ask as a lump-sum price such that he would be indifferent between the lump-sum price and "cost plus 10%fee"?

Note: In general, (e) and (f) require trial and error. Make sure that you use lotteries like those in (c) and (d) to verify that your final answers do result in indifference.

For the following, use the attached "Owner" utility curve and "Contractor I" utility curve:

(g) Find the owner's utility of the price in (a).

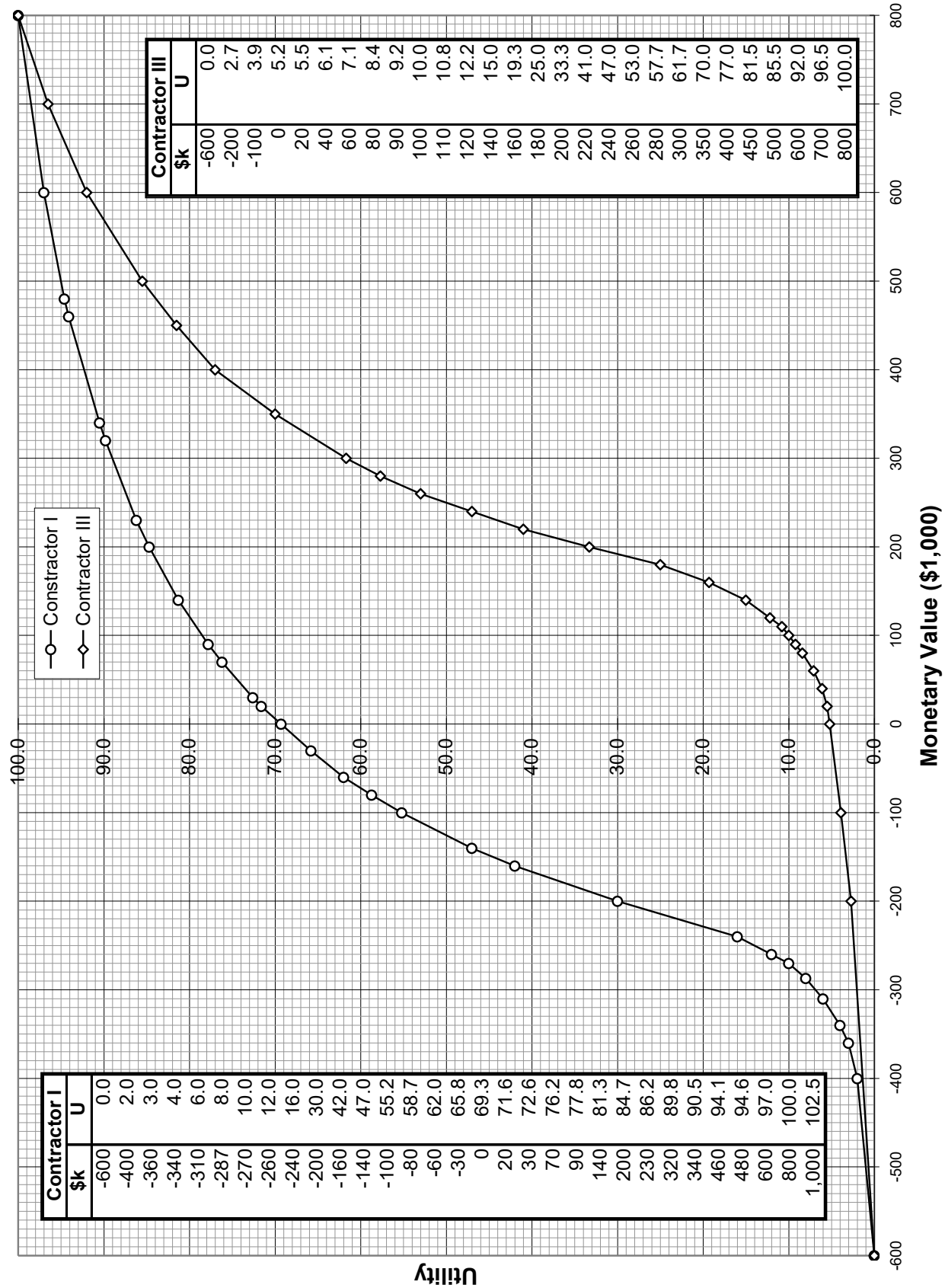
(h) Find the owner's utility of the "cost plus 10%" contract of (d).

(i) Find the owner's utility of the lump-sum price of (f).

(j) At what lump-sum price would the owner be indifferent between a lump-sum price and "cost plus 10%fee"?

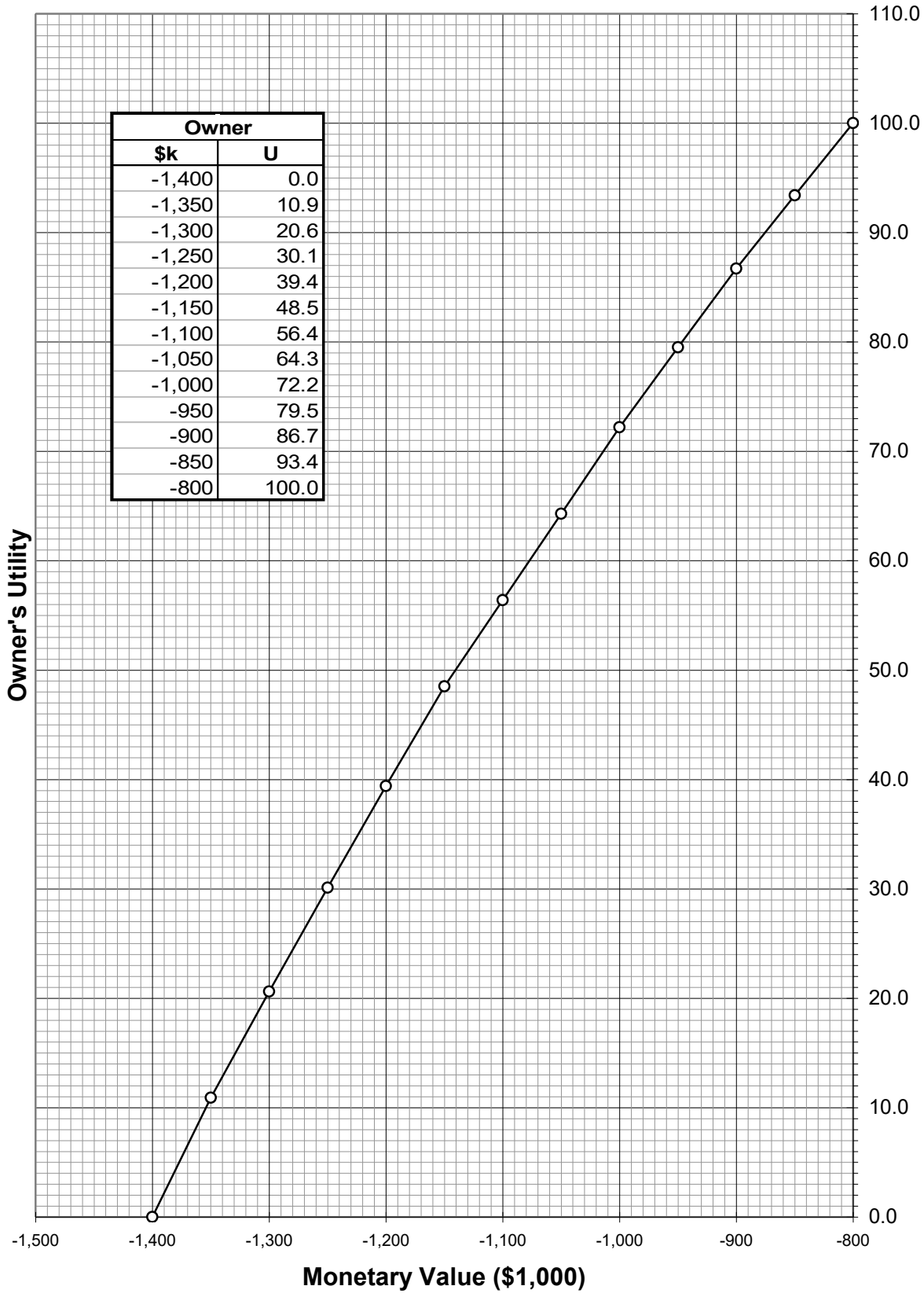
(k) Is it to the owner's advantage to ask for a lump-sum price from a knowledgeable contractor (who can perform these calculations) or to offer a "cost plus 10%fee" contract? Why?

Recommended: Model this problem in Excel and use the add-in function YValue (available at the CEE631 website on Canvas) to automate finding the utility of money from a table.



Contractor I	
$k	U
-600	0.0
-400	2.0
-360	3.0
-340	4.0
-310	6.0
-287	8.0
-270	10.0
-260	12.0
-240	16.0
-200	30.0
-160	42.0
-140	47.0
-100	55.2
-80	58.7
-60	62.0
-30	65.8
0	69.3
20	71.6
30	72.6
70	76.2
90	77.8
140	81.3
200	84.7
230	86.2
320	89.8
340	90.5
460	94.1
480	94.6
600	97.0
800	100.0
1,000	102.5

Contractor III	
$k	U
-600	0.0
-200	2.7
-100	3.9
0	5.2
20	5.5
40	6.1
60	7.1
80	8.4
90	9.2
100	10.0
110	10.8
120	12.2
140	15.0
160	19.3
180	25.0
200	33.3
220	41.0
240	47.0
260	53.0
280	57.7
300	61.7
350	70.0
400	77.0
450	81.5
500	85.5
600	92.0
700	96.5
800	100.0


Owner
$k
U
-1,400
0.0
-1,350
10.9
-1,300
20.6
-1,250
30.1
-1,200
39.4
-1,150
48.5
-1,100
56.4
-1,050
64.3
-1,000
72.2
-950
79.5
-900
86.7
-850
93.4
-800
100.0
Owner's Utility
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-1,500
-1,400
-1,300
-1,200
-1,100
-1,000
-900
-800
Monetary Value ($1,000)