

HADM 4200 - Principles of Real Estate

Professor Lauri Kytömaa

Homework #1 Solutions

Homework #1, Question #1

Spring 2024

Based on Exercise 1.3 in Brueckner, *Lectures on Urban Economics*

Inputs		
Cost per square foot	\$10.00	
	Profit per sq ft	Required square footage
Department store	11.00	9,000.00
Toy store	15.00	1,000.00
Shoe store	3.00	750.00
Assignment table		
Store	Gross profit in isolation	Required square footage
Department	99,000	9,000
Toy	15,000	1,000
Shoe	2,250	750
Affected store table		
Added store (columns)		
Affected store (rows)	Department	Toy Shoe
Department	-	\$3,000 \$1,750
Toy	\$1,500	- \$850
Shoe	\$850	\$1,500 -

Q1 (b) One-store			
		Gross profit	Cost of construction
1S1	Department	\$99,000	\$90,000
1S1	Toy	\$15,000	\$10,000
1S1	Shoe	\$2,250	\$7,500
			Single store profit
1S1			\$9,000
1S1			\$5,000
1S1			(\$5,250)

Q1 (c) Two-store							
	Store 1	Store 2	Gross profit 1	Benefit Store 1	Gross profit 2	Benefit Store 2	Cost of construction
2S1	Department	Toy	\$99,000	\$3,000	\$15,000	\$1,500	\$100,000
2S2	Department	Shoe	\$99,000	\$1,750	\$2,250	\$850	\$97,500
2S3	Toy	Shoe	\$15,000	\$850	\$2,250	\$1,500	\$17,500
							Two-store profit
2S1							\$18,500
2S2							\$6,350
2S3							\$2,100

Q1 (d) Three-store									
	Store 1	Store 2	Store 3	Gross profit 1	Benefit Store 1	Gross profit 2	Benefit Store 2	Gross profit 3	Benefit Store 3
3S1	Department	Toy	Shoe	\$99,000	\$4,750	\$15,000	\$2,350	\$2,250	\$2,350
									Cost of construction
3S1									\$107,500
									Three-store profit
3S1									\$18,200

Q1 (e) Maximum	
Max value	\$18,500
Max scenario	2S1

The department store meaningfully benefits from the presence of both the toy store and the shoe store and vice versa (the shoe store and toy store benefit from the department store). Nonetheless, the shoe store tends to be loss making on its own and any combination with the shoe store has lower profit than without the shoe store

Homework #1, Question #2

Spring 2024

Q2(a)

	One-way	Round-trip
CBD distance	0	0
A1 distance	2	4
A2 distance	4	8
A3 distance	6	12

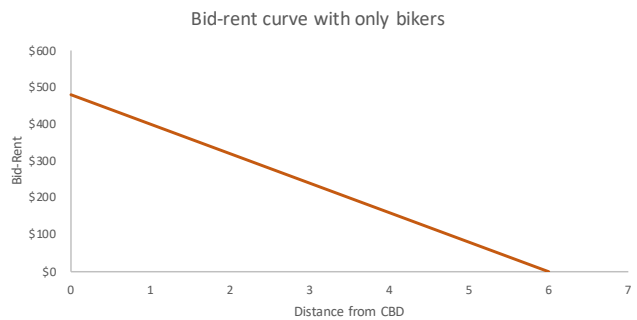
Hourly wage (\$)	30
Speed of travel (mph)	15
\$ per mile	2

Daily costs	
CBD	\$0
A1	\$8
A2	\$16
A3	\$24

Days per month	20
----------------	----

Monthly costs	
CBD	\$0
A1	\$160
A2	\$320
A3	\$480

Bid rent graphic	
	Distance from CBD Bid-rent value
	0 \$480
	2 \$320
	4 \$160
	6 \$0



Q2(b)

Work days in a week	5
Work weeks in a year	48
Work days in a year	240

Yearly costs	
A1	\$1,920
A2	\$3,840
A3	\$5,760

Difference in A1 and A3	\$3,840
-------------------------	---------

Q2(c)

New work days in week	3
	144

New yearly costs	
A1	\$1,152
A2	\$2,304
A3	\$3,456

Difference in A1 and A3	\$2,304
-------------------------	---------

Commuting costs matter less, so their role in rental differentials will fall.

Q2(d)

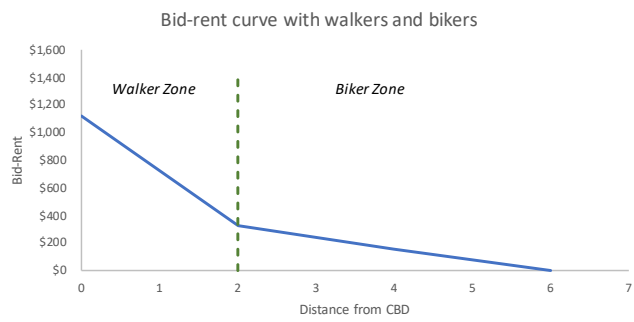
Walker speed of travel (mph)	3
Walker \$ per mile	\$10

Walker monthly cost of commuting	\$800.00
----------------------------------	----------

New bid rent	
	Distance from CBD Bid-rent value
	0 \$1,120
	2 \$320
	4 \$160
	6 \$0

Adding walker cost here

Walkers willing to pay for CBD	\$1,120
--------------------------------	---------



Vertical line for graphic

2	0
2	400
2	600
2	1400

Homework #1, Question #3

Spring 2024

Solution

My polynomial - (used for production function)

Intercept	0
alpha_0	-0.2
alpha_1	0.06
alpha_2	-0.00035

Total employees	250
Price for output	\$200

Fixed cost of each factory	\$500,000
Worker dependent factory cost	\$20,000

(a) - Output/Worker and total output by factories

	Workers	Total output	Output/worker	Total factories	Total output
Option 1	5	0.46	0.09	50	22.81
Option 2	10	3.65	0.37	25	91.25
Option 3	25	27.03	1.08	10	270.31
Option 4	50	96.25	1.93	5	481.25
Option 5	125	228.91	1.83	2	457.81

Value of product	\$25,000.00
------------------	-------------

(b) - Highest profit factory arrangement

Revenue	Total factory cost	Cost / factory	Profit
\$570,312.50	\$30,000,000	\$600,000	(\$29,429,688)
\$2,281,250.00	\$17,500,000	\$700,000	(\$15,218,750)
\$6,757,812.50	\$10,000,000	\$1,000,000	(\$3,242,188)
\$12,031,250.00	\$7,500,000	\$1,500,000	\$4,531,250
\$11,445,312.50	\$6,000,000	\$3,000,000	\$5,445,313

(c) - Discuss

Solves for profits correctly and identifies the right firm

(d)

Provides some reasoned argument based on calculations. Can still get full credit even if there are mistakes in calculation