EBGN 645 HW 1 A Due 10/6/25

Q1 Benny's Bakery
only 40 hrs to work in a week

Prod.	Revenue ($/item)	Cost ($/item)	Time (hours/item)
Roll	2.25	1.5	1.5
Croissant	5.5	2	2.25
Bread	10	5	5

a) Indices $i \in$ {Rolls, Croissant, Bread}
Parameters – r(i) . revenue per item sold, in dollars
roll 2.25
crossiant 5.5
bread 10
parameter - c(i) - cost per item sold, in dollars
roll 1.5
croissant 2
bread 5
Parameter Labor hours required per item i
roll 1.5
croissant 2.25
bread 5
Parameter $\bar{H}$ total labor hours available in a week
$\bar{H} = 40$

Variables $X(i)$ - variable representing the number of units of product i to produce
variable profit – total profit in $
objective function max profit $= \sum_{i \in I} (r(i) - c(i)) \cdot X(i)$
constraints Labor - $\sum_{i \in I} h(i) \cdot X(i) \leq \bar{H}$
total production hours cannot exceed total weekly available labor hours (40)
constraints - nonnegativity - no negative $X(i)$

Q2 b) Counterfactual
raise the price of every croissant
$\lambda(\text{all}) \geq 1$ (constant)

c) Profit Q2.2 making 17.$\bar{7}$ croissants

counterfactual
Profit 45.$\bar{3}$ making 10.$\bar{6}$ to 11/5 $ croissants

Q2