IE 3035 QUIZ 1 26 April 2023

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(Q) Wild West produces two types of cowboy hats. A type 1 hat requires three times as much labor time as a type 2. If the all available labor time is dedicated to Type 2 alone, the company can produce a total of 450 type 2 hats a day. The market limits for the two types are 100 and 300 hats per day for Type 1 and Type 2 respectively. The profit is $8 per Type 1 hat and $5 per Type 2 hat. Determine the number of hats of each type that would maximize profit.

(i) Build the mathematical model of the problem.

(ii) Solve the problem graphically.

Type 2 need a T hours. Then Type 1 need 3T hours.

Total available hours = 450 T

Type 1 → A

Type 2 → B

$3AT + BT \leq 450T$

$3A + B \leq 450$

$A \leq 100$

$B \leq 300$

100

$3A + B = 450$

$300 + B = 450$

$B = 150$

300

$3A + B = 450$

$3A + 300 = 450$

$A = 50$

Following vertices

(0,0) (0,300) (100,150) (50,0)

1 2 3 4

$P(A,B) = 8A + 5B$

$P(0,0) = 8.0 + 5.0 = 0$

$P(0,300) = 8.0 + 5.300 = 1500$

$P(100,150) = 8.100 + 5.150 = 1550$

$P(50,0) = 8.50 + 5.0 = 400$

Max profit of $1550 occurs when the company produces 100 Type1 hats and 150 Type2 hats per day.

(ii)