6.3. The Dual Problem. Monday, October 30, 2017 12:36 PM Goal: Solve the minimization problem with constraints of the form Recall: Last time, we solved the maximization Problem with constraints of the form <. In particular, Maximize P = 5x + 10y Subject to: 8x + 8y \le 160 4x + 12y \le 1 80 Today, the problem is this:

To day, the problem is this:

Minimize:  $1 = 16x_1 + 9x_2 + 21x_3$ Subject to:  $1x_1 + 1x_2 + 3x_3 > 16$ Constraints  $2x_1 + 1x_2 + 1x_3 > 16$ 

Step 3: Use the transpore of the original metrix to rewrite the minimization problem into a maximization This is called forming the Dual Problem

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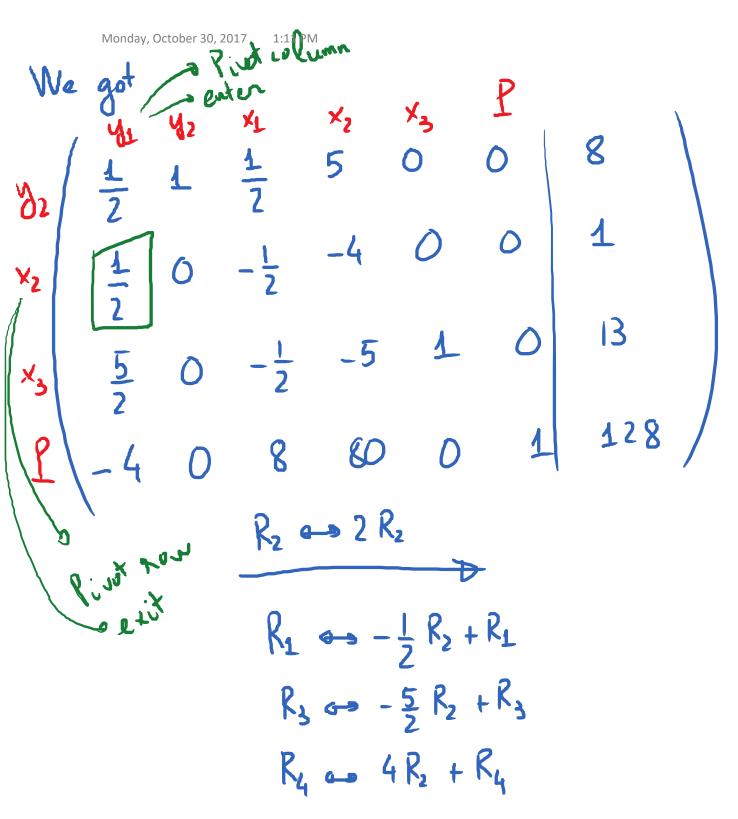
1 2 16  $y_1 + 2y_2 \le 16$ 1 1 9

3 1 21

3 1 21

P = 12y\_1 + 16y\_2 Objective function - maximize

The dual problem is: Maximinize P = 12y2 + 16 y2 Subject to: y1 + 2y2 (5)16 J1 + J2 \le 9 3y, + y2 \( \frac{21}{2} \). y1, y2 20 Step 4: Apply the Simplex method from last time to solve the dual problem. \* Note: Introduce Slack Variables. But now we call them  $x_1, x_2, x_3, \dots$  instead of \* Make the simplex tableau \* Find pivot pontion \* Do non operation, etc.



Step 5: The solution of the original minimization

problem will be read off from the

bottom from of the tableau (instead

of the right most column like last time)

 $S_0, x_1 = 4; x_2 = 48; x_3 = 0$ 

Minimum cost C=136.

HW #2 Slack Variables: X1, X2.

$$2y_{1} + 3y_{2} + x_{1}$$
 $9y_{1} + 8y_{2} + x_{2}$ 

$$-3y_1 - 2y_2 + l = C$$

y 12 3 1 0 0



Pivot now, exit

$$\frac{R_2 \leftrightarrow \frac{1}{9} R_2}{R_3 \leftrightarrow 3 R_2 + R_3}$$

Monday, October 30, 2017 1:47 PM  $\frac{x_1}{4}$   $\frac{x_2}{-\frac{2}{9}}$   $\frac{1}{9}$   $\frac{5}{9}$   $\frac{1}{4}$   $\frac{5}{9}$   $\frac{1}{9}$   $\frac{4}{9}$   $\frac{4}{9}$   $\frac{4}{3}$   $\frac{3}{3}$