

6.6 Foundations of Math II

P. 345 #12, 13

12. Track and field meet

- no more than 250 events
- no fewer than 100 events
- 15 min for track events and 45 min for field events
- considering combinations of events

find least and greatest times for track meet

see graph paper for graph

f: field event
t: track event

$f \in \mathbb{W}$
 $t \in \mathbb{W}$

T: time

Constraints:

$$f+t \geq 100$$

$$f+t \leq 250$$

graph these

Objective function: 15 min = 0.25 hr
45 min = 0.75 hr

$$T = 0.25t + 0.75f$$

t f

$$(0, 250)$$

$$T = 0.25(0) + 0.75(250)$$

$$T = 0 + 187.5$$

$$T = 187.5 \text{ hrs}$$

$$(0, 100)$$

$$T = 0.25(0) + 0.75(100)$$

$$T = 0 + 75$$

$$T = 75 \text{ hrs}$$

$$(100, 0)$$

$$T = 0.25(100) + 0.75(0)$$

$$T = 25 + 0$$

$$T = 25 \text{ hrs}$$

$$(250, 0)$$

$$T = 0.25(250) + 0.75(0)$$

$$T = 62.5 + 0$$

$$T = 62.5 \text{ hrs}$$

minimum time: 25 hrs

maximum time: 187.5 hrs

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2 summer jobs

- works no more than total 32 h per week (whole hours)
- job 1: works no less than 12 h
earns \$8.75/h
- job 2: works no more than 24 h
earns \$9.00/h

What hours will give maximum earnings?

What will she earn?

j : job 1

$j \in W$

b : job 2

$b \in W$

E : earnings

constraints:

$$\begin{aligned} j &\geq 12 \\ b &\leq 24 \\ j + b &\leq 32 \end{aligned}$$

See graph paper for graph

objective function: $E = 8.75j + 9b$

$$\begin{aligned} (12, 20) \\ E &= 8.75(12) + 9(20) \\ E &= 105 + 180 \\ E &= 285 \end{aligned}$$

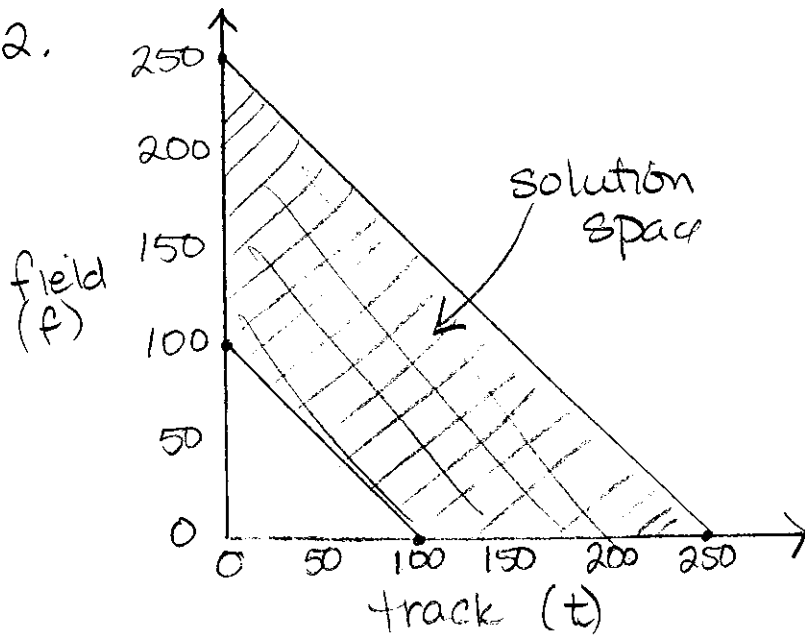
$$\begin{aligned} (12, 0) \\ E &= 8.75(12) + 9(0) \\ E &= 105 + 0 \\ E &= 105 \end{aligned}$$

$$\begin{aligned} (32, 0) \\ E &= 8.75(32) + 9(0) \\ E &= 280 + 0 \\ E &= 280 \end{aligned}$$

Her maximum earnings are \$285 when she works 12 hours at \$8.75 and 20 hours at \$9.

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vertices are
 $(0, 250)$ $(100, 0)$
 $(0, 100)$ $(250, 0)$

13.

