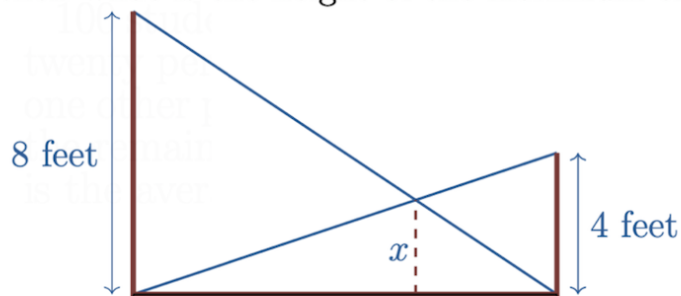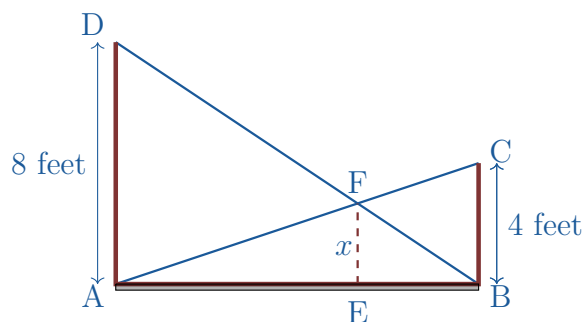Solution to Problem 4

Spring 2023

Problem 4

A straight road has walls on both sides of height 8 feet and 4 feet respectively. Two ladders are placed from the top of one wall to the foot of the other, then what is the height of the maximum clearance x as shown below?

8 feet

4 feet

x

Solution. After labelling the above diagram

D

8 feet

C

F

4 feet

x

A

E

B

we notice that the triangle ΔAEF is similar to ΔABC, and the triangle ΔEBF is similar to ΔABD, therefore

$$\frac{|AE|}{|AB|} = \frac{x}{4} \text{ and } \frac{|EB|}{|AB|} = \frac{x}{8}.$$

By adding the equations above, we get

$$1 = \frac{|AB|}{|AB|} = \frac{|AE| + |EB|}{|AB|} = \frac{|AE|}{|AB|} + \frac{|EB|}{|AB|} = \frac{x}{4} + \frac{x}{8} = \frac{3x}{8},$$

and therefore, $x = \frac{8}{3}$.

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