$L_1 = 174$
$L_2 = 116$
$L_3 = 108$
$L_4 = 110$

(a)

$L_1 = 4.46$ $L_2 = 2.75$
$L_3 = 3.26$ $L_4 = 2.75$
$AP = 1.63$

(b)

FIGURE P12-11

Problems 12-27 to 12-30

[†‡]12-27   Figure P12-11a shows a fourbar linkage and its dimensions in mm. All links are 4-mm-thick steel. Link 3 has a uniform cross section and is 20 mm wide with ends that extend 10 mm beyond the pivot holes. Links 2 and 4 have a 10-mm radius at each end. Design counterweights to force balance the linkage using the method of Berkof and Lowen.

[†‡]12-28   Use the data of Problem 12-27 to design the necessary balance weights and other features to completely eliminate the shaking force and shaking moment the linkage exerts on the ground link.

[†‡]12-29   Figure P12-11b shows a fourbar linkage and its dimensions in inches. All links have a uniform 0.5-in wide x 0.2-in thick cross-section and are made from steel. Link 3 has squared ends that extend 0.25 in from the pivot point centers. Links 2 and 4 have rounded ends that have a radius of 0.25 in. Design counterweights to force balance the linkage using the method of Berkof and Lowen.

[†‡]12-30   Use the data of Problem 12-29 to design the necessary balance weights and other features to completely eliminate the shaking force and shaking moment the linkage exerts on the ground link.