

PUZZLES FOR ECONOMISTS
VERSION 0.0.1
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Problem 1. *Cost of the Best Bundle 1*

Every day, a consumer gets to choose from a pair of bundles of two goods. For each bundle, the amount of good one and good two are drawn uniformly and independently from $[0, 1]$. The cost of bundle (x_1, x_2) is $x_1 + x_2$. The consumer chooses the bundle that maximizes utility $U(x_1, x_2) = \min\{x_1, x_2\}$. What is the average cost of the bundle that the consumer chooses?

Problem 2. *Cost of the Best Bundle 2*

Every day, a consumer gets to choose from a pair of bundles of two goods. For each bundle, the amount of good one and good two are drawn uniformly and independently from $[0, 1]$. The cost of bundle (x_1, x_2) is $x_1 + x_2$. The consumer chooses the bundle that maximizes utility $U(x_1, x_2) = x_1 x_2$. What is the average cost of the bundle that the consumer chooses?

Problem 3. *Building a Norman Window.*

You are tasked with building a *Norman Window*. The window must be composed of a rectangular base and topped by a semi-circle with diameter equal to the width of the rectangle (see diagram below). Since you do not have much wood left, you are limited to making a window with perimeter no more than p . Your goal is to maximize the area of window so it can pass as much light as possible. What are the w and h of the window you build? *Note: either w or h can be zero.*

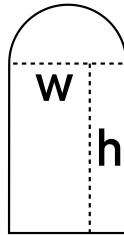


FIGURE 0.1. A Norman Window

Problem 4. *Building a Flanked Norman Window.*

You are tasked with building a *Flanked Norman Window*. The window must be composed of a rectangular base and topped by a semi-circle with diameter equal to the width of the rectangle and with two semi-circles at the sides of the rectangle with diameter equal to the height of the rectangle (see diagram below). Since you do not have much wood left, you are limited to making a window with perimeter no more than p . Your goal is to maximize the area of window so it can pass as much light as possible. What are the w and h of the window you build? *Note: either w or h can be zero.*

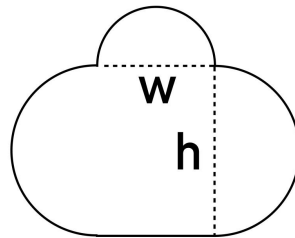


FIGURE 0.2. A Flanked Norman Window