

## Optimization Case Study 1

### Skipping Stone Quality Control

#### Background:

A company produces and sells round flat stones used for skipping. They make stones of various distinct sizes by a somewhat random process. Since the process is random, they need to inspect each stone to see if it is 'round' enough, i.e. close enough to being a circle, and if it is close enough to one of the standard sizes. Then stones are then sorted into the appropriate bin by size (or rejected). They have decided to automate this process by installing a digital camera over a conveyor belt that will carry the stones. The camera is connected to a computer that can control where the conveyor belt sends the individual stones.

#### Problem:

The camera will take a digital image of the rock on the conveyor belt and then the computer is able to find points on the boundary of the rock. Given these points, determine if the rock is a circle or not and what its radius is.

#### Considerations:

The camera has limited resolution and thus even for an exact circle, the points produced may not all lay on a circle.

Also, some of the points might not be as clear as others.

Besides the 'circularity' of the stone, the company would like an evaluation of the robustness of this system.

