

## Answers to Selected Exercises

### 10. Geometric Models

1. Buffon's Problems
  2. Bertrand's Paradox
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#### 1. Buffon's Problems

- 1.5.  $1 - \frac{(h-2r)(w-2r)}{hw}$ ,  $r < \min\{\frac{h}{2}, \frac{w}{2}\}$
- 1.7.  $X = U - \frac{1}{2}$ ,  $Y = V - \frac{1}{2}$ , where  $U$  and  $V$  are random numbers.
- 1.12.
- a.  $\frac{1}{6}$
  - b.  $\frac{5}{12}$
  - c.  $\frac{1}{2\pi}$
  - d.  $\frac{3}{2\pi}$
- 1.24.  $X = \pi U$ ,  $Y = V$ , where  $U$  and  $V$  are random numbers.

#### 2. Bertrand's Paradox

- 2.13.  $A = \arccos(D)$ ,  $X = 2D^2 - 1$ ,  $Y = 2D\sqrt{1-D^2}$ , where  $D$  is a random number.
- 2.18.  $A = \frac{\pi}{2}U$ ,  $D = \cos(A)$ ,  $X = 2D^2 - 1$ ,  $Y = 2D\sqrt{1-D^2}$ , where  $U$  is a random number.
- 2.23. Uniform distance
- 2.24. Uniform angle
- 2.25. Uniform angle
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