Use a proper correction for continuity in both problems.

1. The daily water demands for a city pumping station exceed 500,000 gallons with probability only 0.15. Over a 30-day period, find the approximate probability that demand for over 500,000 gallons per day occurs no more than twice.

**Solution:**

If $X \sim \text{bin}(30, .15)$ and $W \sim \mathcal{N}(4.5, 3.825)$ then

$$P(X \leq 2) = P(W < 2.5) = P(Z < (2.5 - 4.5)/\sqrt{3.825}) = P(Z < -1.02) = .1539.$$  

At a specific intersection, vehicles entering from the east are equally likely to turn left, turn right, or proceed straight ahead. If 500 vehicles enter this intersection from the east tomorrow, what is the approximate probability that

(a) 150 or fewer turn right?

(b) at least 350 turn?

**Solution:**

(a) If $X \sim \text{bin}(500, 1/3)$ and $W \sim \mathcal{N}(500 \times 1/3, 500 \times 1/3 \times 2/3)$ then

$$P(X \leq 150) = P(W < 150.5) = P(Z < (150.5 - 500 \times 1/3)/\sqrt{500 \times 1/3 \times 2/3}) = P(Z < -1.53) = .0630.$$  

(b) If $X \sim \text{bin}(500, 2/3)$ and $W \sim \mathcal{N}(500 \times 2/3, 500 \times 1/3 \times 2/3)$ then

$$P(X \geq 350) = P(W > 349.5) = P(Z > (349.5 - 500 \times 2/3)/\sqrt{500 \times 1/3 \times 2/3}) = P(Z > 1.53) = .0630.$$