Addition Solutions

5. Mean and Median. Mean is a better estimator.

12. Flag 1: 100% chance it's on a distinct pole

Flag 2: $\frac{11}{12}$ ← 1 pole already taken

Flag 3: $\frac{10}{12}$ ← 2 taken

4: $\frac{9}{12}$

5: $\frac{8}{12}$

$$P = 1 \cdot \frac{11}{12} \cdot \frac{10}{12} \cdot \frac{9}{12} \cdot \frac{8}{12} = 0.382$$

14. $p(x) = \frac{1}{1000} \cdot e^{-\frac{t}{1000}}$

$$\int_{2000}^{\infty} p(x)\, dx = \int_{2000}^{\infty} \frac{1}{1000} e^{-\frac{t}{1000}}\, dx$$

$$= -e^{-\frac{t}{1000}} \Big|_{2000}^{\infty}$$

$$= e^{-2}$$

15. Assume binomial distribution.

$$P(X \leq 15) = 1 - P(X=20) - P(X=19) - P(X=18) - P(X=17) - P(X=16)$$

$p = .886$

$q = .114$

$$= 1 - \binom{20}{0} p^{20} - \binom{20}{1} p^{19} q - \binom{20}{2} p^{18} q^2 - \binom{20}{3} p^{17} q^3 - \binom{20}{4} p^{16} q^4$$

$= 1 - .089 - .229 - .279 - .216 = 118$

$= \boxed{0.069}$

16. A period is continuous, but the expected number of goals in a period is discrete.

$\lambda = \frac{209}{218} = 0.958$ $\qquad p(x) = \frac{\lambda^x e^{-\lambda}}{x!}$

$P(x > 2) = 1 - P(0) - P(1) - P(2)$

$= 1 - .384 - .368 - .176 = \boxed{0.072}$

17. ~~P(AM ∧ Late)~~

17. $E(\text{Flights } (AM \wedge Late)) = 9$

$E[\text{Flights } (UN \wedge Late)] = 4.8$

$E[\text{Flights } (SW \wedge Late)] = 5$

$P(SW \mid Late) = \frac{5}{9+4.8+5} = \boxed{0.266}$