1. a) $F(1) = \lim_{x \to 1} F(x) = \lim_{x \to 1} x/2 = 1/2$. $F(3) = 1$.
   b) $P(1 \leq X \leq 3/2) = P(X \leq 3/2) - P(X < 1) = F(3/2) - \lim_{x \to 1} F(x) = 3/4 - 1/4 = 1/2$.

2. a) $P(Z > .5) = 30.85\%$.
   b) $15 - (1.5)(0.67) = 14$ feet.

3. The number of aces $X$ has a hypergeometric distribution. So

   \[ P(X = 2) = \binom{4}{2} \binom{20}{4} / \binom{24}{6} \approx 21.6\%, \quad \text{and} \quad \text{EXP} = 1. \]

4. a) Probability mass functions must sum to one. So

   \[ \sum_{k=1}^{\infty} \frac{c}{k!} = c(e - 1) = 1, \]

   and $c = 1/(e - 1) \approx 0.582$. The expected value is

   \[ \text{EXP} = \sum_{k=1}^{\infty} \frac{ck}{k!} = \frac{e}{e - 1} \approx 1.582. \]

5. a) The count $X$ has a Poisson distribution with $\lambda = 1.5$, and so

   \[ P(X \geq 2) = 1 - P(X = 0) - P(X = 1)1 - e^{-1.5} - 1.5e^{-1.5} \approx 42.2\%. \]

   b) $T$ has an exponential distribution with $\lambda = 3$, and so $P(T > m) = e^{-3m}$. Setting
   this equal to 1/2 and solving, $m = (\log 2)/3 \approx 0.231$ years (or 2.77 months or 84.3 days).

6. For $y \geq 0$,

   \[ F_Y(y) = P(Y \leq y) = P(\sqrt{X} \leq y) = P(X \leq y^2) = \int_{0}^{y^2} e^{-x} dx = 1 - e^{-y^2}. \]

   For $y < 0$, $F_Y(y) = 0$. The density is

   \[ f_Y(y) = F_Y'(y) = \begin{cases} 2ye^{-y^2}, & y \geq 0; \\
   0, & y < 0. \end{cases} \]