第四次习题解答 by 许岷

- 1.解： (1) $X \geq 20$

  (2) $0 \leq X \leq 10$

  (3) $X = 2n + 1, n = 0, 1, 2, 3, 4;$

- 4.解：在每点上是等可能的，

  $$F(x) = \begin{cases} 0, & for, x < 0 \\ x, & for, 0 \leq x \leq 1 \\ 1, & for, x > 1 \end{cases}$$

- 6.解：

  (1) 由分布函数的有界性可知：

  $\lim_{x \to \infty} F(x) = 1.$

  $F(0) = 0$ 解出方程组，

  $a = \frac{1}{2}, b = \frac{1}{\pi}$

  (2) $P(-1 \leq x \leq \sqrt{3}) = F(\sqrt{3}) - F(-1) = \frac{7}{12}$

  (3) $P(x \geq c) = 1 - F(c) = \frac{1}{4}$ 解得，c=1

- 8.解：

$$P(x = 3) = \frac{1}{3^3} = \frac{1}{27}$$

$$P(x = 2) = \frac{2^3}{3^3} - P(x = 3) = \frac{7}{27}$$

$$P(x = 1) = 1 - P(x = 3) - P(x = 2) = \frac{19}{27}$$

$$F(x) = \begin{cases} 0, & for, x < 1 \\ 19/27, & for, 1 \leq x < 2 \\ 26/27, & for, 12 \leq x < 3 \\ 1, & for, x > 3 \end{cases}$$

- 12.解：由几何概率可知：

$$P(X = k) = \frac{2}{5} \times ((\frac{3}{5})^{k-1})$$

$$\begin{aligned} P(X = 2k - 1) &= \frac{2}{5} \times ((\frac{3}{5})^0 + (\frac{3}{5})^2 + ... + ((\frac{3}{5})^{2k})) \\ &= \frac{2}{5} \times (1 - (\frac{\frac{3}{5}^{2k}}{\frac{4}{25}})) \\ &= \frac{5}{8} \end{aligned}$$

- 13.解：

  (1)由正则性可知： $p(X = 1) + P(X = 2) + ... + P(X = k) + ... = 1$

  由泊松分布构造可知： $a \times (e^\lambda - 1) = 1, a = \frac{1}{e^\lambda - 1}$

  (2) 由正则性可知：

  $p(X = 1) + P(X = 2) + ... + P(X = k) + ... = 1, , a \times (1 - (\frac{1}{2})^n)) = 1$,
  a=1