Math 327 Homework 3 Anchu A. Lee
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Question 3.4
$S = \{HHH, THHH, HTHHH, TTHHH, TTTHHH, HTTHHH, THTHHH, HHTHHH\}$
S is discrete because you cannot flip a fraction of a heads or tails.

Question 3.10
The probability of rolling any side of a fair six sided die is $\frac{1}{6}$, so the formula for probability distribution is $f(x) = \frac{1}{6}$ for $x = 1, 2, 3, 4, 5, 6$ Equal chance of getting any side.

Question 3.12

- $P(T = 5) = F(5) - F(4) = \frac{1}{4}$
- $P(T > 3) = 1 - F(3) = \frac{1}{2}$
- $P(1.4 < T < 6) = F(6) - F(1.4) = \frac{1}{2}$
- $P(T \leq 5 \mid T \geq 2) = \frac{P(2 \leq T \leq 5)}{P(T \geq 2)} = \frac{F(5)-F(2)}{1-F(2)} = \frac{2}{3}$

Question 3.14
$x = \frac{12}{60}$

- $F(x) = F(0.2) = 1 - e^{-8(0.2)} = 0.79810...$
- $f(x) = \frac{dF}{dx} = 8e^{-8x}$ when $x > 0$
  $\int_0^{0.2} f(x)dx = \int_0^{0.2} 8e^{-8x}dx = 8\int_0^{0.2} e^{-8x}dx = -e^{-8x}\Big|_0^{0.2} = 0.79810...$

Question 3.18

- $P(X < 4) = \int_2^4 \frac{2(1+x)}{27}dx = 0.59259...$
- $P(3 \leq X < 4) = \int_3^4 \frac{2(1+x)}{27}dx = 0.33333...$

Question 3.20
$F(x) = \int_2^x \frac{2(1+t)}{27}dt = \frac{2}{27} \cdot \int_2^x 1 + tdt = \frac{2}{27}\ (t + \frac{t^2}{2})\Big|_2^x = \frac{(x+4)(x-2)}{27}$
$P(3 \leq X < 4) = F(4) - F(3) = \frac{(4+4)(4-2)}{27} - \frac{(3+4)(3-2)}{27} = 0.33333...$

Question 3.24
$\binom{10}{4}$ ways of selecting 4 CDs from 10. We want x number of jazz CDs from 5 $\binom{5}{x}\binom{5}{4-x}$
$f(x) = \frac{\binom{5}{x}\binom{5}{4-x}}{\binom{10}{4}}$
$x = 0, 1, 2, 3, 4$

Question 3.30

- $1 = k\int_{-1}^{1}(3 - x^2) = \frac{16}{3}k$, $k = \frac{3}{16}$
- $P(X < 0.5) = \int_{-1}^{0.5} \frac{3}{16}(3 - x^2)dx = 0.7734375$
- $F(x) = \int_{-1}^{x} \frac{3}{16}(3 - t^2)dt = (3t - \frac{1}{3}t^3)\big|_{-1}^{x} = \frac{1}{2} + \frac{9}{16}x - \frac{x^3}{16}$
  $P(|X| < 0.7) = P(X < -0.8) + P(X > 0.8) = F(-0.8) + 1 - F(0.8) = 0.164$

Question 3.32

- aasd

Question 3.38
Question 3.40
Question 3.44
Question 3.46
Question 3.50
Question 3.68
Question 3.80

$$\left.\frac{\frac{1}{x}}{\frac{\frac{x}{5}}{1+\frac{x}{7}}}\right|_{-5}^{17}$$