

p.48

①

48. Cars hold 2, 4, 5 people

451

1-21

9 passengers

2	4	3
2	3	4
2	2	5
1	4	4
1	3	5

$$\frac{9!}{2! \cdot 4! \cdot 3!} + \frac{9!}{2! \cdot 3! \cdot 4!} + \frac{9!}{2! \cdot 2! \cdot 5!} + \frac{9!}{1! \cdot 4! \cdot 4!} + \frac{9!}{1! \cdot 3! \cdot 5!}$$

$$= 4410$$

p.56

64. Experiment: Roll 5 dice

Event: 4 of a kind

$$P(\text{event}) = \frac{n(\text{event})}{n(S)} = \frac{6 \times 5 \times 5}{6^5}$$

← choices for replicated die
 ← choices for other die
 ← positions

$$= .0193$$

②

p.48

38. a) $8!$ b) $4! \times 2^4 = 384$

c) $(4!)^2$

$$\underline{8} \times \underline{1} \times \underline{6} \times \underline{1} \times \underline{4} \times \underline{1} \times \underline{2} \times \underline{1} = 384$$

(3)

p.48

50. 365 possible birthdays

60 people

Keep track of
order $P(\text{no birthdays in common})$

$$= \frac{n(\text{no birthdays in common})}{n(S)}$$

$$= \frac{365 \cdot 364 \cdot \dots \cdot (365 - 60 + 1)}{365^{60}}$$

$$= P_{60}^{365} / 365^{60} = .0059$$

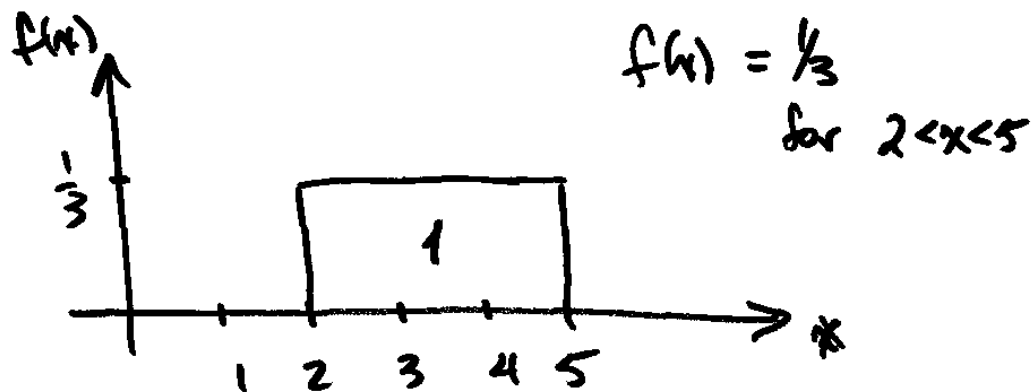
(4)

Continuous random variables

$$P(a < X < b) = \int_a^b \underbrace{f(x)}_{\substack{\text{probability} \\ \text{density} \\ \text{function}}} dx$$

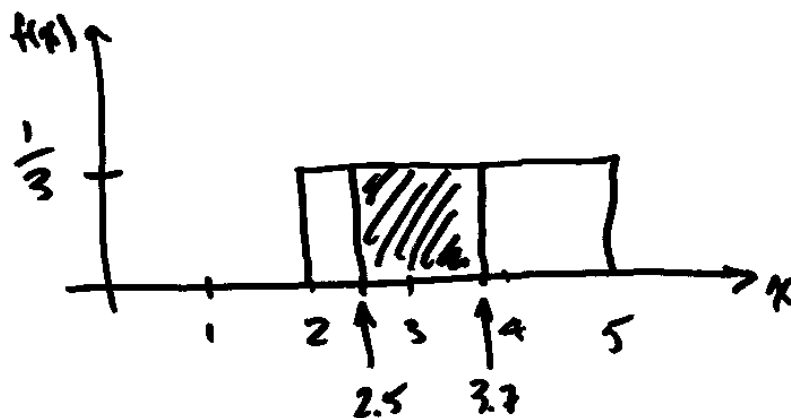

Example: Suppose that X takes on all possible values from 2 to 5, with equal (constant) density throughout the interval.

(5)



Find the probability that X lies between 2.5 and 3.7

(6)



$$P(2.5 < X < 3.7) = 1.2 \times \frac{1}{3} = .4$$

OR:

(7)

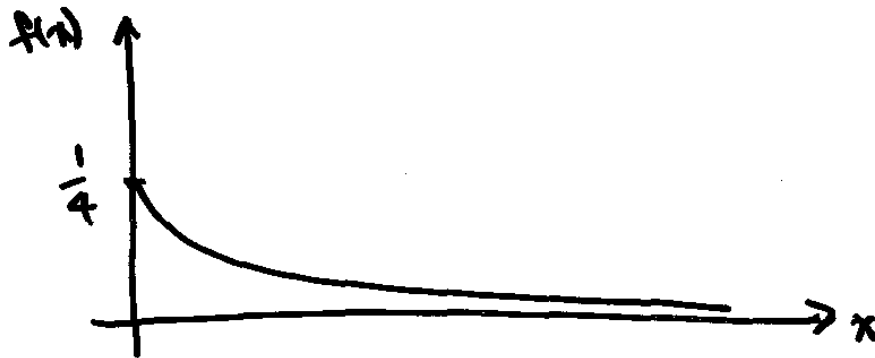
$$P(2.5 < x < 3.7) = \int_{2.5}^{3.7} f(x) dx$$

$$= \int_{2.5}^{3.7} \frac{1}{3} dx = \frac{1}{3} x \Big|_{2.5}^{3.7}$$

$$= \frac{1}{3}(3.7) - \frac{1}{3}(2.5) = .4$$

Example: $f(x) = \frac{1}{4} e^{-x/4}, x \geq 0$

(8)



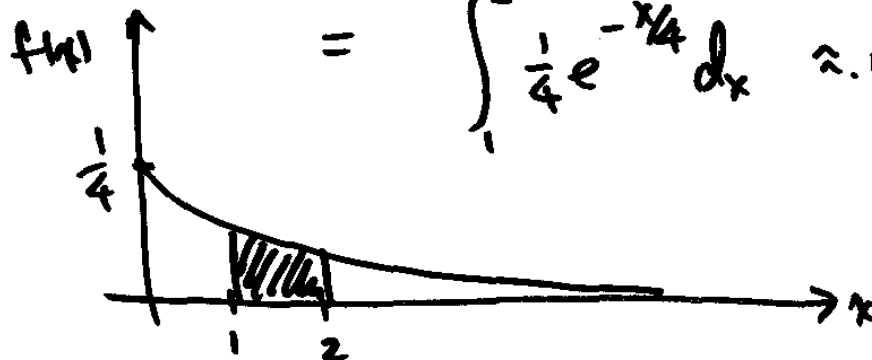
Check: $1 \stackrel{?}{=} \int_0^{\infty} \frac{1}{4} e^{-x/4} dx$

let $u = -x/4$
 $\frac{du}{dx} = -\frac{1}{4}$
 $du = -\frac{1}{4} dx$

$$\int_0^{\infty} \frac{1}{4} e^{-x/4} dx = \int_0^{-\infty} -e^u du \quad (9)$$

$$= -e^u \Big|_0^{-\infty} = 0 - (-1) = 1 \checkmark$$

Find $P(1 < X < 2)$

$$= \int_1^2 \frac{1}{4} e^{-x/4} dx \approx .172$$


$$= \int_{-1/4}^{-1/2} -e^u du$$

let $u = -x/4$
 $du = -\frac{1}{4} dx$

$$= -e^u \Big|_{-1/4}^{-1/2} = -e^{-1/2} - (-e^{-1/4})$$

$$= e^{-.25} - e^{-.5}$$

$$= .1723$$

HW #3

due 1/28

p.65 # 80, 86, 98

p.72 # 102, 104

p.88 # 8, 18, 24