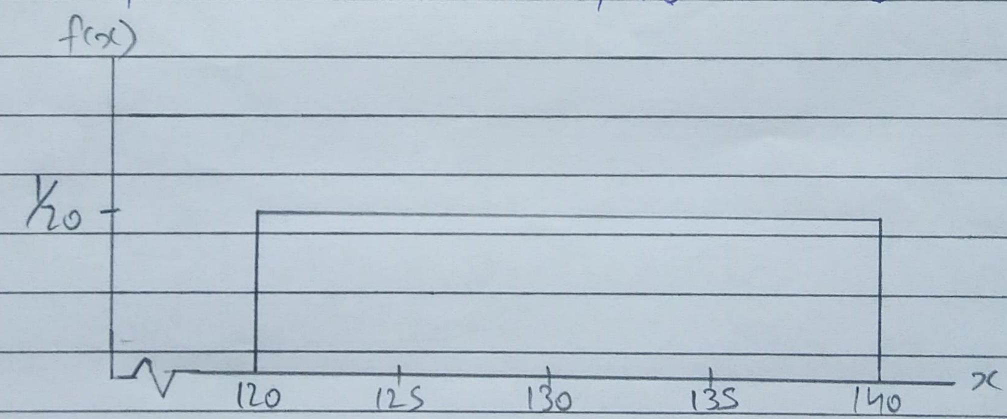
Uniform Probability Distribution

A continuous probability distribution for which the probability that the random variable will assume a value in any interval is the same for each interval of eqval length.

* Uniform Probability Density function:

$$f(x) = \begin{cases} \frac{1}{b-a} & \text{for } a \le x \le b \\ 0 & \text{elsewhere} \end{cases}$$

* Graph of uniform probability density function



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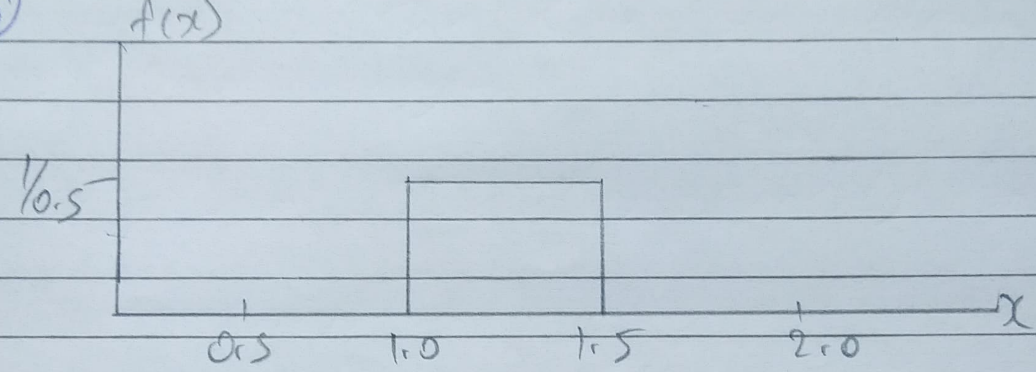
① The random variable x is known to be uniformly distributed between 1.0 and 1.5

(a)



(b)

$P(x = 1.25) = 0$

The probability of and single Point is zero becarse the area under the curve above any single point is zero

(c) $f(x) = \frac{1}{b-a}$; $b - a = 1.25 - 1.0$
$= 0.25$

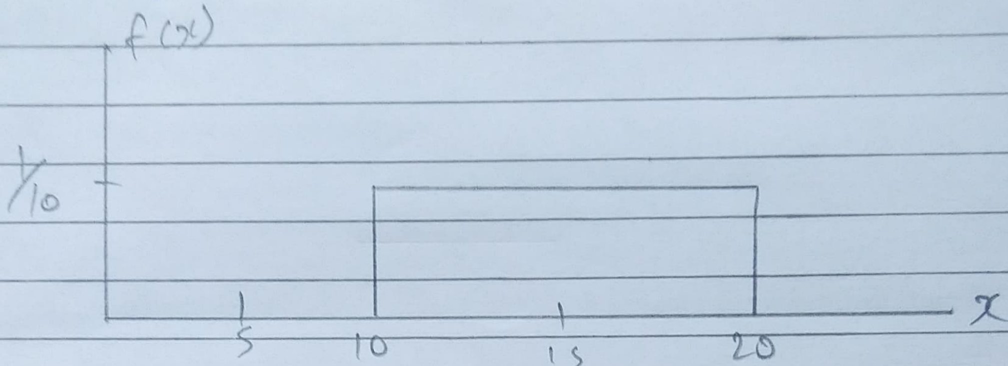
$P(1.0 \le x \le 1.25) = 0.25 \times \frac{1}{0.5} = 0.5$ //

(d) $(b - a) = (1.5 - 1.2) = 0.3$

$P(1.2 \le x \le 1.5) = 0.3 \times \frac{1}{0.5} = 0.6$ //

(2) The random variable, x is known to be uniformly distributed between 10 and 20.

(a)



(b) $(b-a) = (15-10) = 5$

$P(x \leq 15) = 5 \times \frac{1}{10} = 0.5$

(c) $(b-a) = (18-12) = 6$

$P(12 \leq x \leq 18) = 6 \times \frac{1}{10} = 0.6$

(3) Delta Airlines quotes a flight time of 2 hours, 5 minutes for its flights from Cincinnati to Tampa. Suppose we believe that actual flight times are uniformly distributed between 2 hours and 2 hour 20 min.

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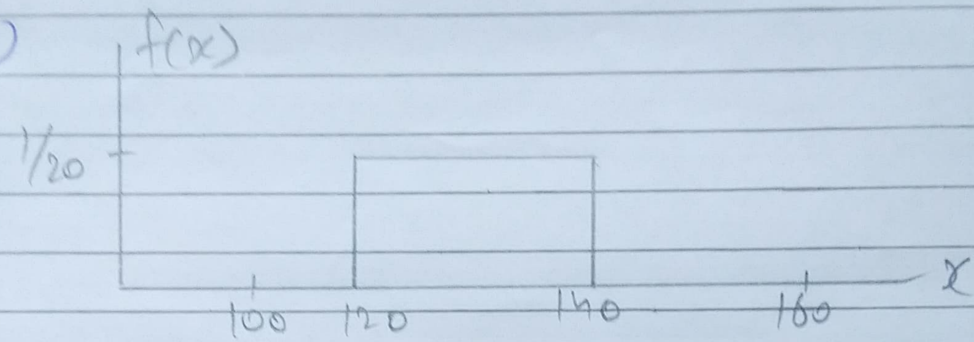
ⓐ



ⓑ $(b-a) = (130-120) = 10$

$P(120 \le x \le 130) = 10 \times \frac{1}{20} = 0.5$

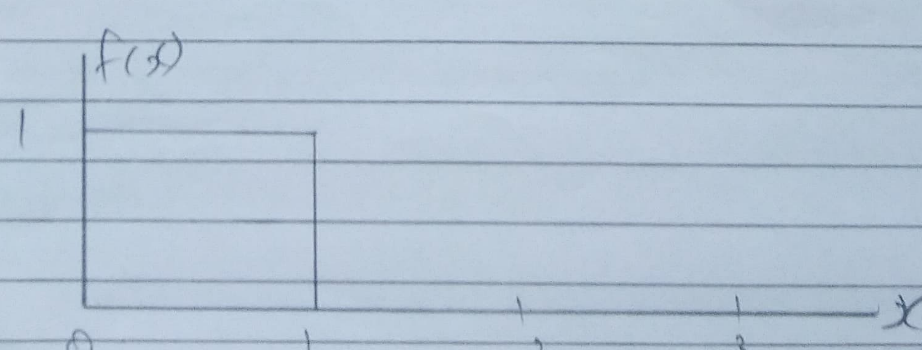
ⓒ $(b-a) = (140-135) = 5$

$P(x > 135) = 5 \times \frac{1}{20} = 0.25$

ⓓ x is a continuous random variable with probability density function.

$$f(x) = \begin{cases} 1 & \text{for } 0 \le x \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

ⓐ



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(b) $(b-a)\ (0.75-0.25) = 0.5$

$P(0.25 \le x \le 0.75) = 0.5 \times 1 = 0.5$ //

(c) $P(x \le 0.3) = 0.3 \times 1 = 0.3$ //

(d) $(b-a) = (1-0.6) = 0.4$ //

$P(x > 0.6) = 0.4 \times 1 = 0.4$ //

(6) On Average 30 mins television sitcom have 22 mins of programming (CNBC, feb 23 2006). Assume that the probability distribution for minutes of Programming can be approximated by a uniform distribution from 18 mins to 26 mins.

(a) $f(x) = \frac{1}{b-a} = \frac{1}{26-18} = \frac{1}{8}$

$P(x > 25) = (b-a) = (26-25) = 1$

$P(x > 25) = 1 \times \frac{1}{8} = 0.125$ //

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(b) $(b-a) = (25-21) = 4$

$P(21 \le x \le 25) = 4 \times \frac{1}{8} = 0.5$ //

(c) $30 - 22 = 8$ mins for other commercials

$P(x > 10) = (10-8) \times \frac{1}{8} = 0.25$ //