Institut Teknologi Sepuluh Nopember
Surabaya

DEPARTEMEN TEKNIK FISIKA - FTIRS

FS. DISTRIBUSI PROBABILITAS

Aulia Siti Aisjah

Fs. Distribusi Variabel Acak

Capaian Pembelajaran:

Mampu membedakan berbagai fungsi distribusi variable acak, dan menggunakan nya untuk penentuan karakteristik variable acak tersebut.

Kajian:

1. Definisi Fs Distribusi Variabel Acak
2. Beberapa Fs. Distribusi Diskrit dan kontinyu

Variabel acak kontinyu

Perhatikan sebuah tabel dalam pembagian skala tiap 1000 unit penjualan sebuah produk tertentu

interval		
(0,1000]		
(1000,2000]		
(2000,3000]		
(3000,4000]		
(4000,5000]		
(5000,6000]		
(6000,7000]		

Penjualan Jumlah produk sabun mandi merek X di kota Surabaya per harian

Variabel acak kontinyu

interval	relative freq.	
(0,1000]	0	
(1000,2000]	0.05	
(2000,3000]	0.25	
(3000,4000]	0.30	
(4000,5000]	0.25	
(5000,6000]	0.10	
(6000,7000]	0.05	
	1.00	

Frekuensi relatif untuk setiap interval

Variabel acak kontinyu

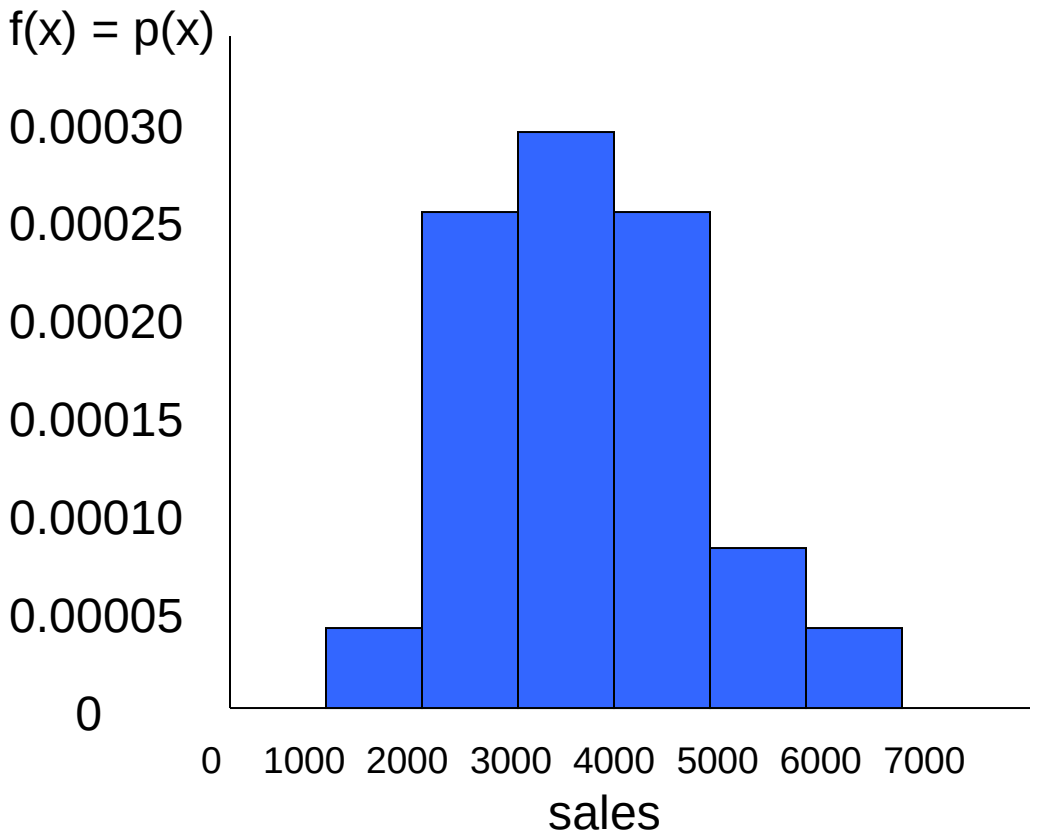
interval	relative freq.	$f(x) = \frac{\text{relative freq.}}{\text{cell width}}$
(0,1000]	0	0
(1000,2000]	0.05	0.00005
(2000,3000]	0.25	0.00025
(3000,4000]	0.30	0.00030
(4000,5000]	0.25	0.00025
(5000,6000]	0.10	0.00010
(6000,7000]	0.05	0.00005

Frekuensi relatif dibagi dalam setiap lebar kelas / lebar sel

Variabel acak kontinyu

Grafik

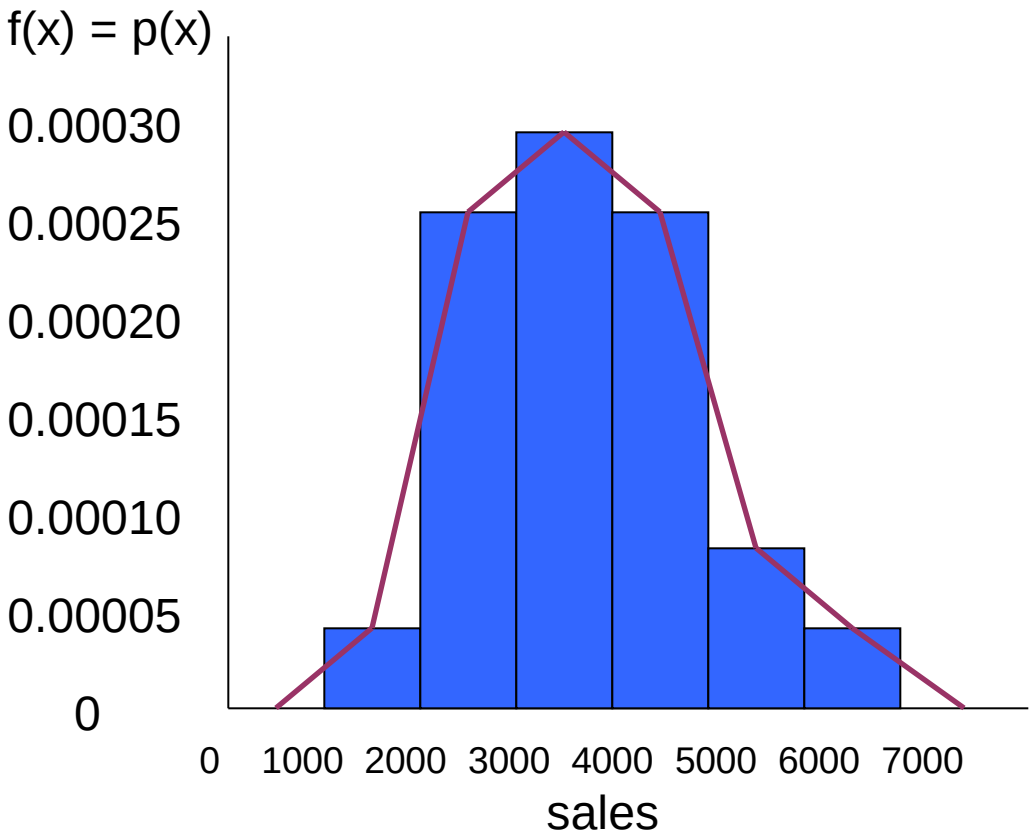
interval	$f(x) = \frac{\text{relative freq.}}{\text{cell width}}$
(0,1000]	0
(1000,2000]	0.00005
(2000,3000]	0.00025
(3000,4000]	0.00030
(4000,5000]	0.00025
(5000,6000]	0.00010
(6000,7000]	0.00005



Luasan di bawah kurva adalah 1.

Materi

interval	$f(x) = \frac{\text{relative freq.}}{\text{cell width}}$
(0,1000]	0
(1000,2000]	0.00005
(2000,3000]	0.00025
(3000,4000]	0.00030
(4000,5000]	0.00025
(5000,6000]	0.00010
(6000,7000]	0.00005



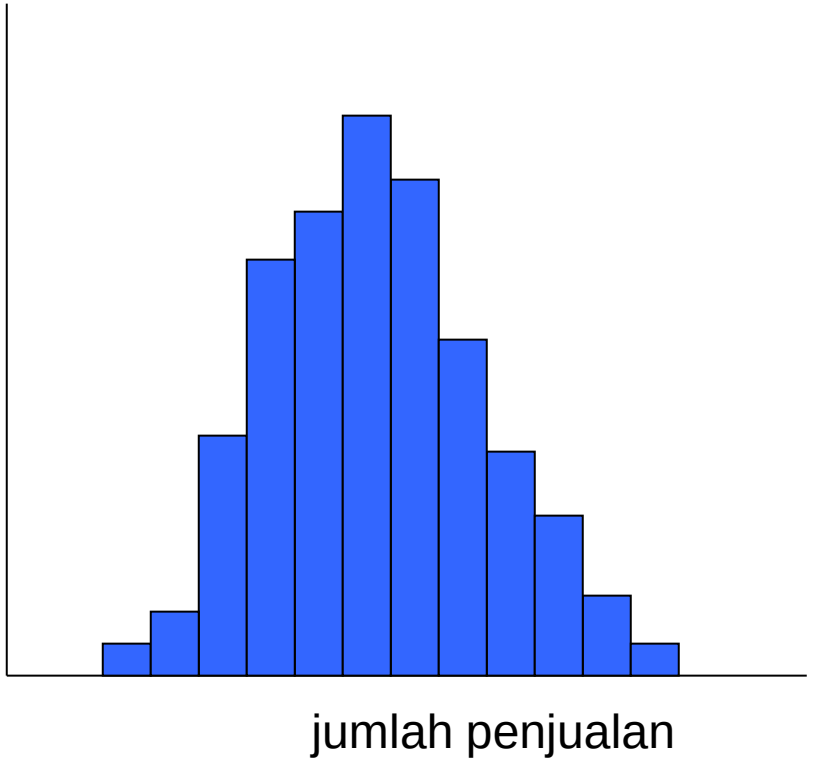
Grafik

Ini merupakan kurva …….?

Materi

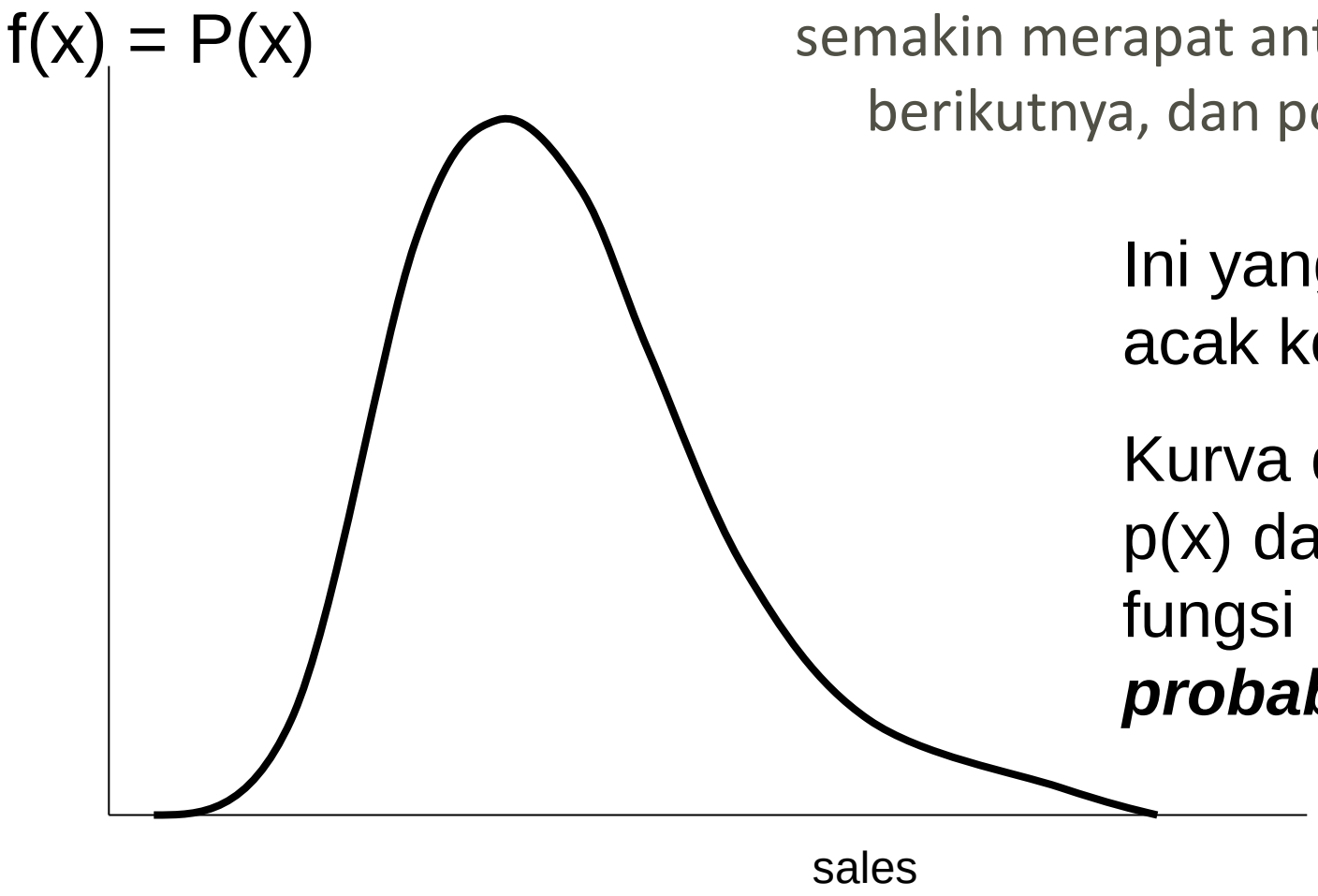
Jika dibuat interval untuk setiap 500 unit, kemungkinan grafik nya:

f(x) =P(x)



Tinggi batang akan naik, dan lebar interval akan mengecil / mengerucut.

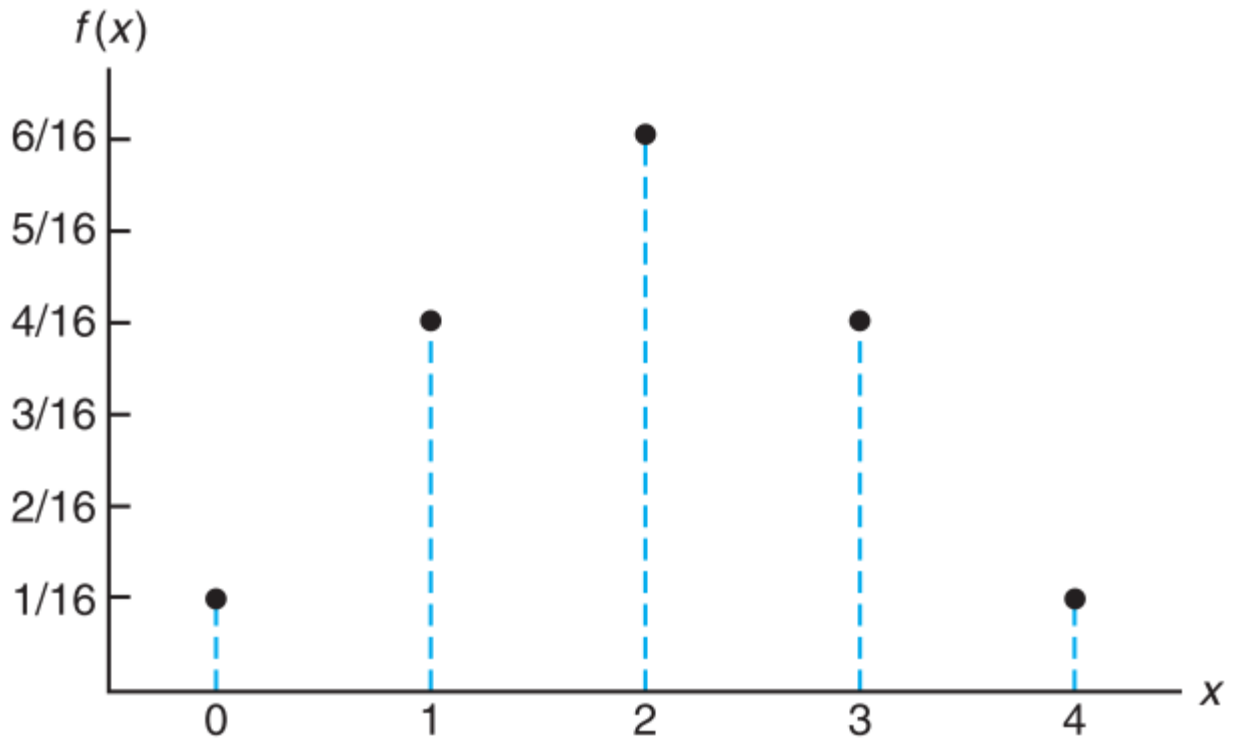
Jika dibuat interval lebih kecil lagi, maka tinggi batang akan semakin merapat antara interval satu dengan interval berikutnya, dan poligon frekuensi semakin smooth



Ini yang dinamakan variabel acak kontinyu.

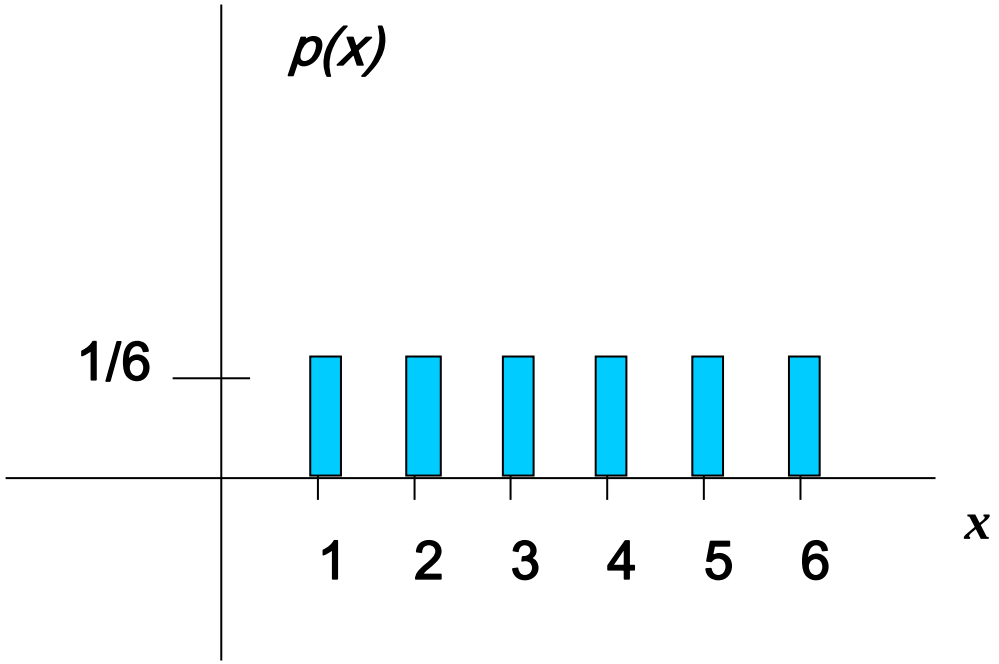
Kurva diberi notasi f(x) atau p(x) dan dikatakan sebagai fungsi kerapatan probabilitas - ***probability density function***.

Fs. Distribusi Probabiltas – Pelemparan dadu

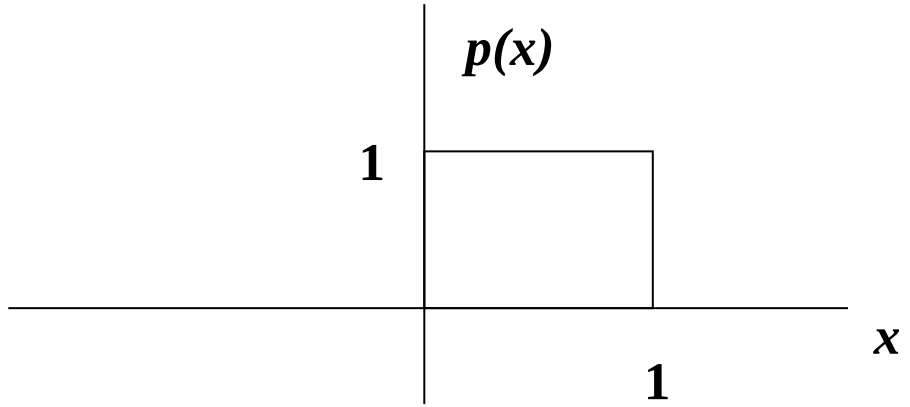


Beberapa bentuk fungsi Distribusi Probabilitas

Fs Distribusi Uniform

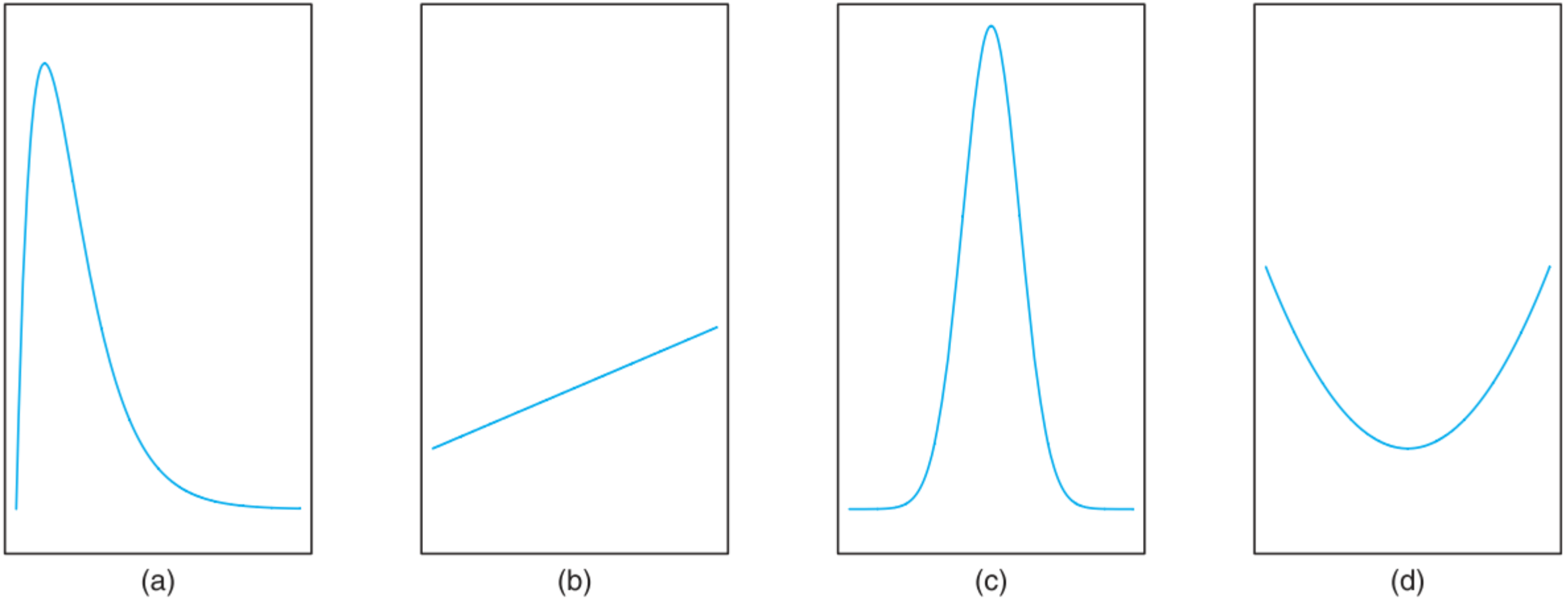


$$\sum_{\text{all } x} P(x) = 1$$



$$f(x) = 1, \quad \text{for } 1 \geq x \geq 0$$

Beberapa bentuk Fs distribusi Probabilitas - Kontinyu



Sifat Fs. Distribusi Probabilitas

Var. acak Diskrit

1. $f(x) \geq 0,$
2. $\sum_x f(x) = 1,$
3. $P(X = x) = f(x).$

Var. acak kontinyu

1. $f(x) \geq 0, \text{ for all } x \in R.$
2. $\int_{-\infty}^{\infty} f(x)\, dx = 1.$
3. $P(a < X < b) = \int_a^b f(x)\, dx.$

Tugas

3.6 The shelf life, in days, for bottles of a certain prescribed medicine is a random variable having the density function

$$f(x) = \begin{cases} \frac{20{,}000}{(x+100)^3}, & x > 0, \\ 0, & \text{elsewhere.} \end{cases}$$

Find the probability that a bottle of this medicine will have a shell life of

(a) at least 200 days;

(b) anywhere from 80 to 120 days.

3.7 The total number of hours, measured in units of 100 hours, that a family runs a vacuum cleaner over a period of one year is a continuous random variable X that has the density function

$$f(x) = \begin{cases} x, & 0 < x < 1, \\ 2 - x, & 1 \leq x < 2, \\ 0, & \text{elsewhere.} \end{cases}$$

Find the probability that over a period of one year, a family runs their vacuum cleaner

(a) less than 120 hours;

(b) between 50 and 100 hours.

3.12 An investment firm offers its customers municipal bonds that mature after varying numbers of years. Given that the cumulative distribution function of T, the number of years to maturity for a randomly selected bond, is

$$F(t) = \begin{cases} 0, & t < 1, \\ \frac{1}{4}, & 1 \leq t < 3, \\ \frac{1}{2}, & 3 \leq t < 5, \\ \frac{3}{4}, & 5 \leq t < 7, \\ 1, & t \geq 7, \end{cases}$$

find

(a) $P(T = 5)$;

(b) $P(T > 3)$;

(c) $P(1.4 < T < 6)$;

(d) $P(T \leq 5 \mid T \geq 2)$.

- Catat semua Informasi tambahan dari perkuliahan – online


Terímakasíh