



Universitas Gadjah Mada
Jurusan Teknik Sipil dan Lingkungan
Prodi Magister Teknik Pengelolaan Bencana Alam

Teknik Pengolahan Data

Tabel dan Grafik

Organisasi Data

- Koleksi data statistik perlu disusun (diorganisir) sedemikian hingga dapat “dibaca” dengan jelas.
- Salah satu pengorganisasian data statistik adalah dengan:
 - tabel
 - grafik

Organisasi Data

- Tabel
 - Di dalam tabel, setiap *raw score* (“data mentah”) sejenis dikelompokkan.
 - Pengelompokkan tersebut kemudian dirangkum ke dalam suatu tabel yang ringkas.

Presentasi Data

Tabel

- Nilai data (*scores*) mudah dibaca
- Pola sebaran data tidak mudah dibaca
- Tampilan data yang utama/pertama

Grafik

- Nilai data (*scores*) tidak mudah dibaca
- Pola sebaran data mudah dibaca
- Memerlukan tabel; langkah pembuatan grafik diawali dengan pembuatan tabel

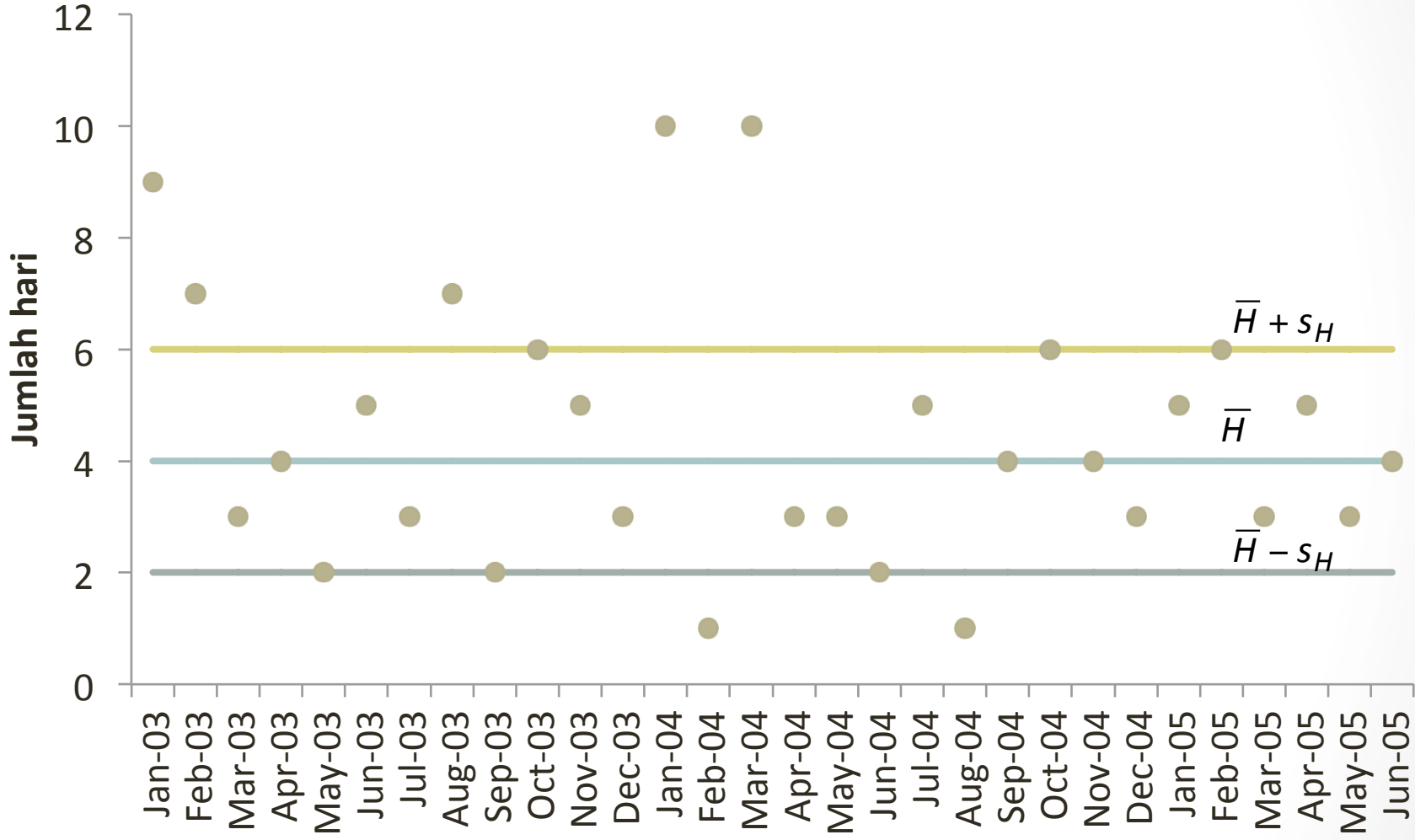
Contoh #1

- Data hujan harian di suatu stasiun selama 30 bulan selama Januari 2003 s.d. Juni 2005
 - Hari hujan per bulan

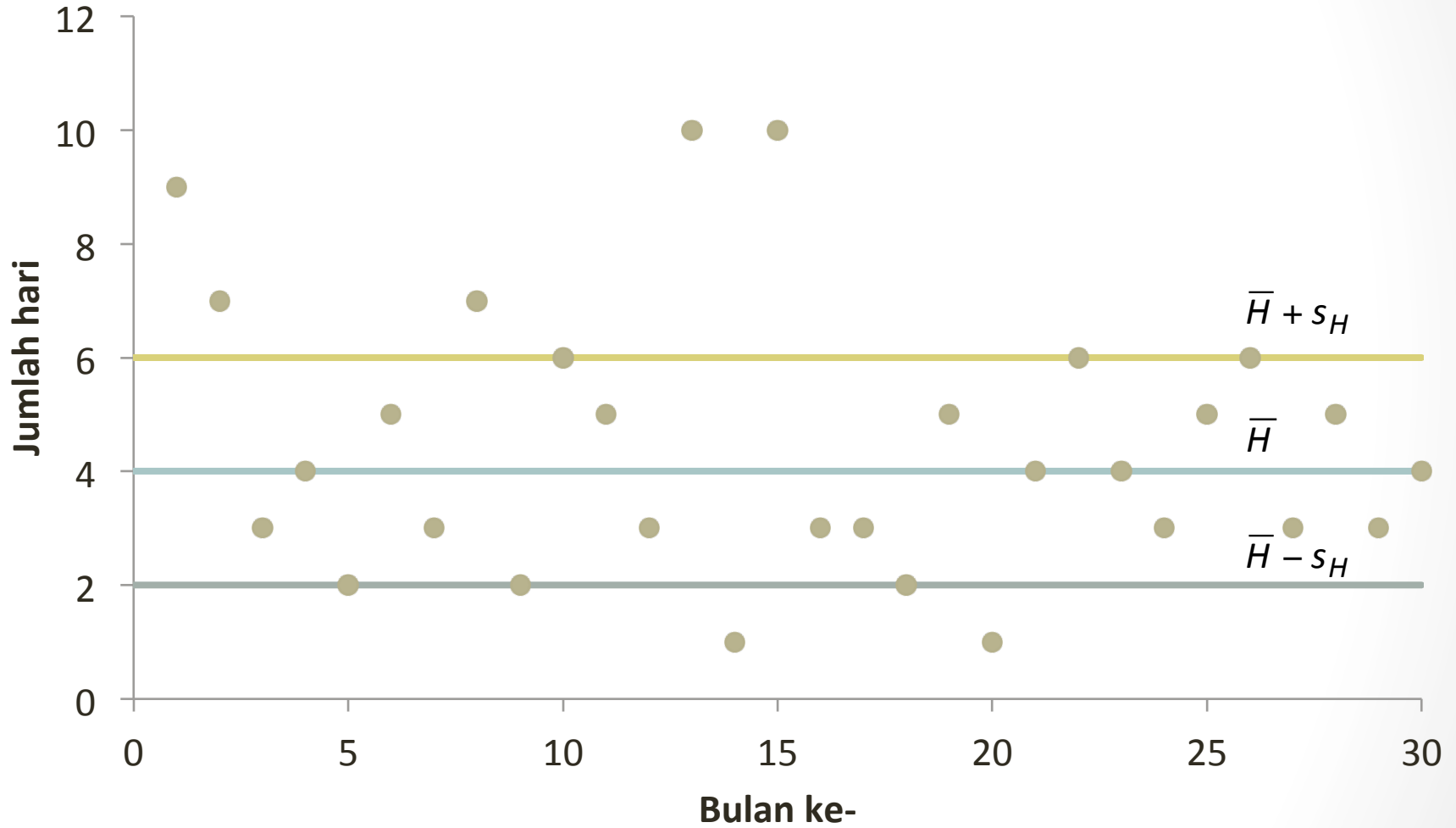
Hari hujan dalam sebulan

| Bulan | Bulan ke- | Tanggal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | Jumlah | | | | |
|--------|-----------|---------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------|----|----|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 31 | | | |
| Jan-03 | 1 | 1 | | | | | 1 | 1 | | | | 1 | | | | | 1 | | | | 1 | | | 1 | 1 | | | 1 | | | | | | 9 | | |
| Feb-03 | 2 | | | | 1 | | 1 | | | | 1 | | | 1 | | | | 1 | 1 | 1 | | | | | | | | | | | | | | 7 | | |
| Mar-03 | 3 | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | | | 1 | | 3 | | |
| Apr-03 | 4 | | | | | | | 1 | | | | | | | 1 | | | | | | | 1 | | | | | | | | | 1 | | | 4 | | |
| May-03 | 5 | | | | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 | | |
| Jun-03 | 6 | | 1 | | | | | | | | | 1 | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | 5 | | |
| Jul-03 | 7 | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | 3 | | |
| Aug-03 | 8 | 1 | | | | 1 | | | | 1 | | | | | | | | 1 | | | | | | | 1 | 1 | | | | | 1 | | | 7 | | |
| Sep-03 | 9 | | | | | | | | | | | 1 | | | | | | | | | | 1 | | | | | | | | | | | | 2 | | |
| Oct-03 | 10 | | | 1 | | | | 1 | | | | | 1 | | | | | | 1 | | | | | 1 | | | 1 | | | | | | | 6 | | |
| Nov-03 | 11 | | | | | | | | | | 1 | | | | 1 | | | | | 1 | | | | | 1 | | | | | 1 | | | | 5 | | |
| Dec-03 | 12 | | | | | 1 | | 1 | | | | 1 | | | | | | | | | | | | | | | | | | | | | | | 3 | |
| Jan-04 | 13 | 1 | 1 | | | | | | 1 | 1 | | | | | | 1 | 1 | 1 | | | | | | | 1 | 1 | | | | | 1 | | | 10 | | |
| Feb-04 | 14 | | | | | | | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | 1 | |
| Mar-04 | 15 | | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | 1 | | | | | | | | | | | | 10 | | |
| Apr-04 | 16 | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | | | | | | | 3 | |
| May-04 | 17 | | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | 1 | | | 3 | |
| Jun-04 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | | | 2 | |
| Jul-04 | 19 | | | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | 5 | |
| Aug-04 | 20 | | | | | | | | | | | | | | 1 | | | | | | | | | | | | | | | | | | | | 1 | |
| Sep-04 | 21 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 | |
| Oct-04 | 22 | | | | | | | 1 | | | | | 1 | | | | | 1 | | | | | | 1 | | | | | 1 | 1 | | | | | 6 | |
| Nov-04 | 23 | | 1 | | 1 | | | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | | | | | 4 | |
| Dec-04 | 24 | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | | | | | | | | | | | | | | 3 | |
| Jan-05 | 25 | | | | | 1 | 1 | | | | | | | 1 | | | | | | | | 1 | | | 1 | | | | | | | | | | 5 | |
| Feb-05 | 26 | | | | | | | | | 1 | | | | 1 | | | | 1 | | | | | 1 | | | | 1 | | | 1 | | | | | 6 | |
| Mar-05 | 27 | | | | | | | | | | | | 1 | | | | 1 | | | | | | | | 1 | | | | | | | | | | 3 | |
| Apr-05 | 28 | | | | 1 | | 1 | | | 1 | | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | 5 | |
| May-05 | 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | | | | 3 |
| Jun-05 | 30 | | 1 | 1 | | | | | | | | | 1 | | 1 | | | | | | | | | | | | | | | | | | | | | 4 |

Jumlah hari hujan per bulan



Jumlah hari hujan per bulan



Tabel Frekuensi: jumlah hari hujan per bulan periode Jan-03 s.d. Jun-05

| Jumlah hari hujan per bulan | Frekuensi |
|-----------------------------|-----------|
| 10 | 2 |
| 9 | 1 |
| 8 | 0 |
| 7 | 2 |
| 6 | 3 |
| 5 | 5 |
| 4 | 4 |
| 3 | 7 |
| 2 | 3 |
| 1 | 2 |
| 0 | 1 |
| Jumlah | 30 |

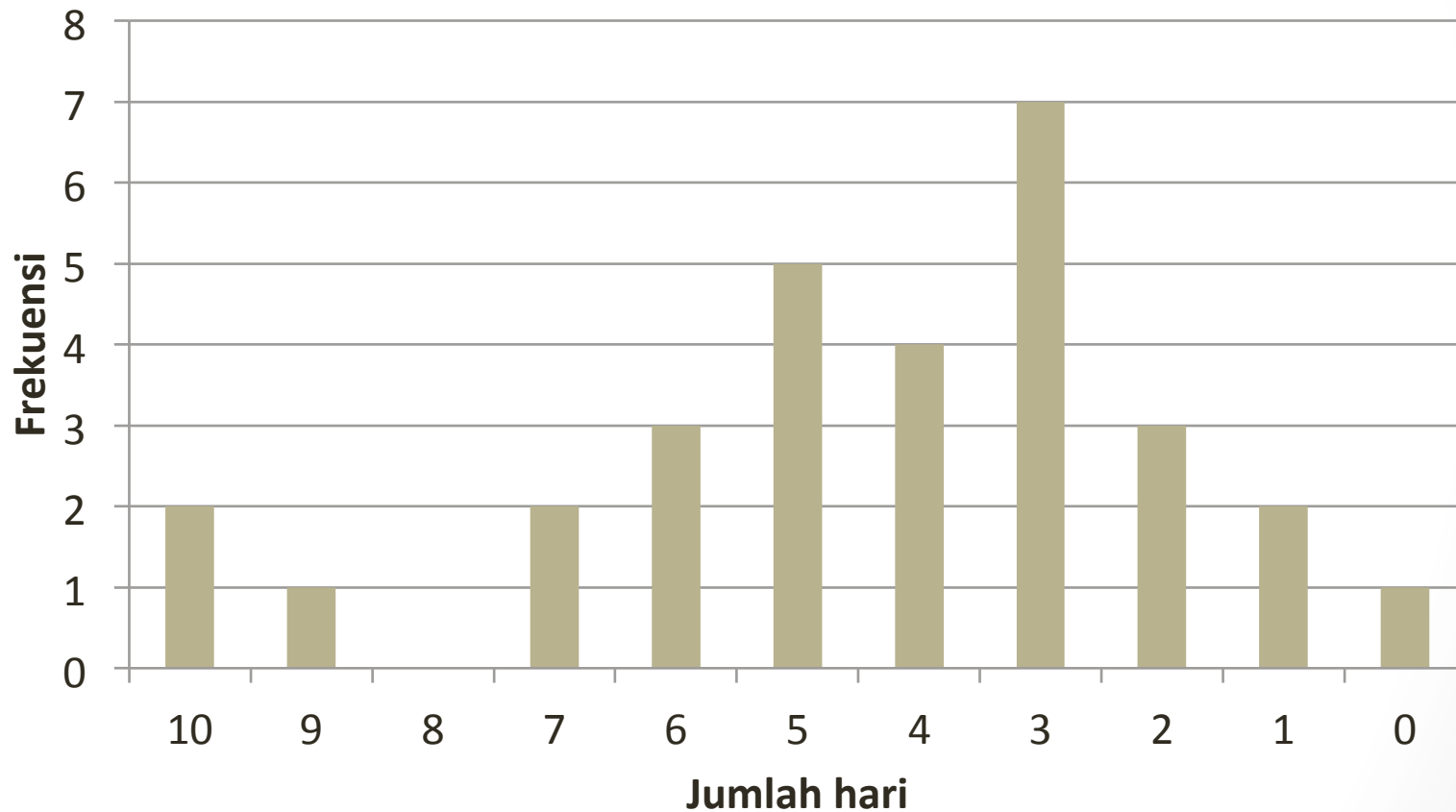
Tabel Frekuensi: jumlah hari hujan per bulan periode Jan-03 s.d. Jun-05

| Jumlah hari hujan per bulan | Frekuensi |
|-----------------------------|-----------|
| 10 | 2 |
| 9 | 1 |
| 8 | 0 |
| 7 | 2 |
| 6 | 3 |
| 5 | 5 |
| 4 | 4 |
| 3 | 7 |
| 2 | 3 |
| 1 | 2 |
| 0 | 1 |
| Jumlah | 30 |

| Jumlah hari hujan per bulan | Frekuensi |
|-----------------------------|-----------|
| 0 | 1 |
| 1 | 2 |
| 2 | 3 |
| 3 | 7 |
| 4 | 4 |
| 5 | 5 |
| 6 | 3 |
| 7 | 2 |
| 8 | 0 |
| 9 | 1 |
| 10 | 2 |
| Jumlah | 30 |

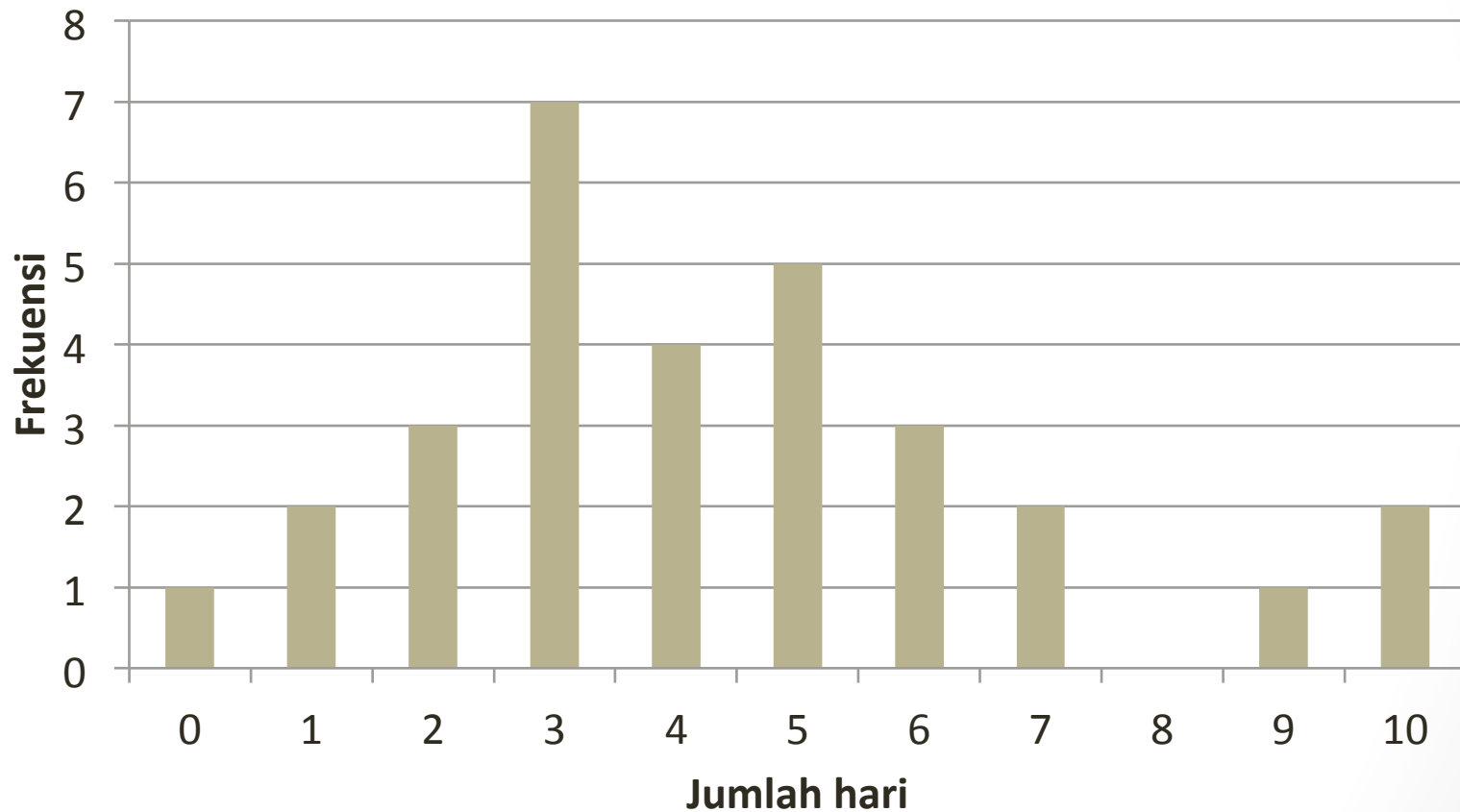
Bar Chart

Jumlah hari hujan selama 30 bulan



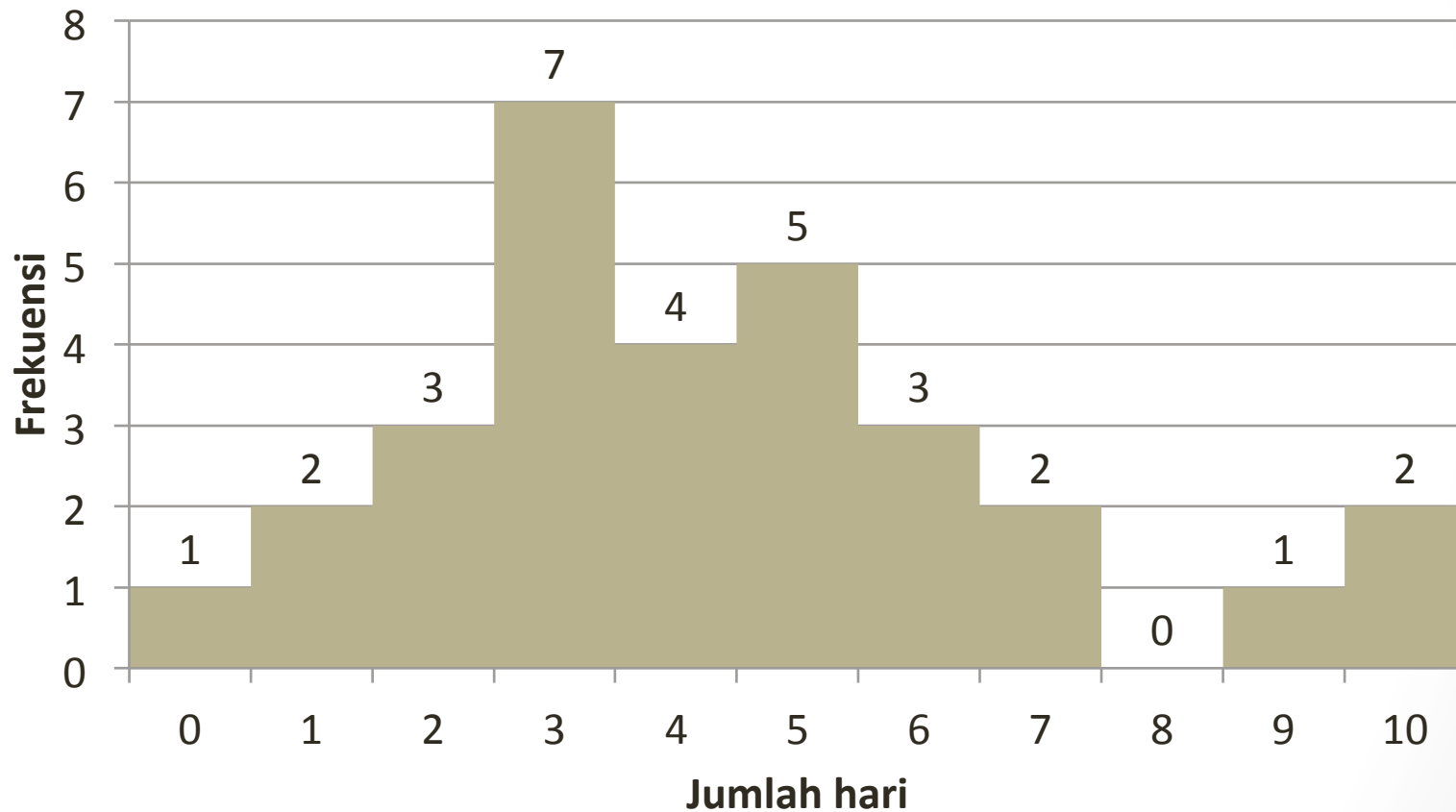
Bar Chart

Jumlah hari hujan per bulan selama 30 bulan



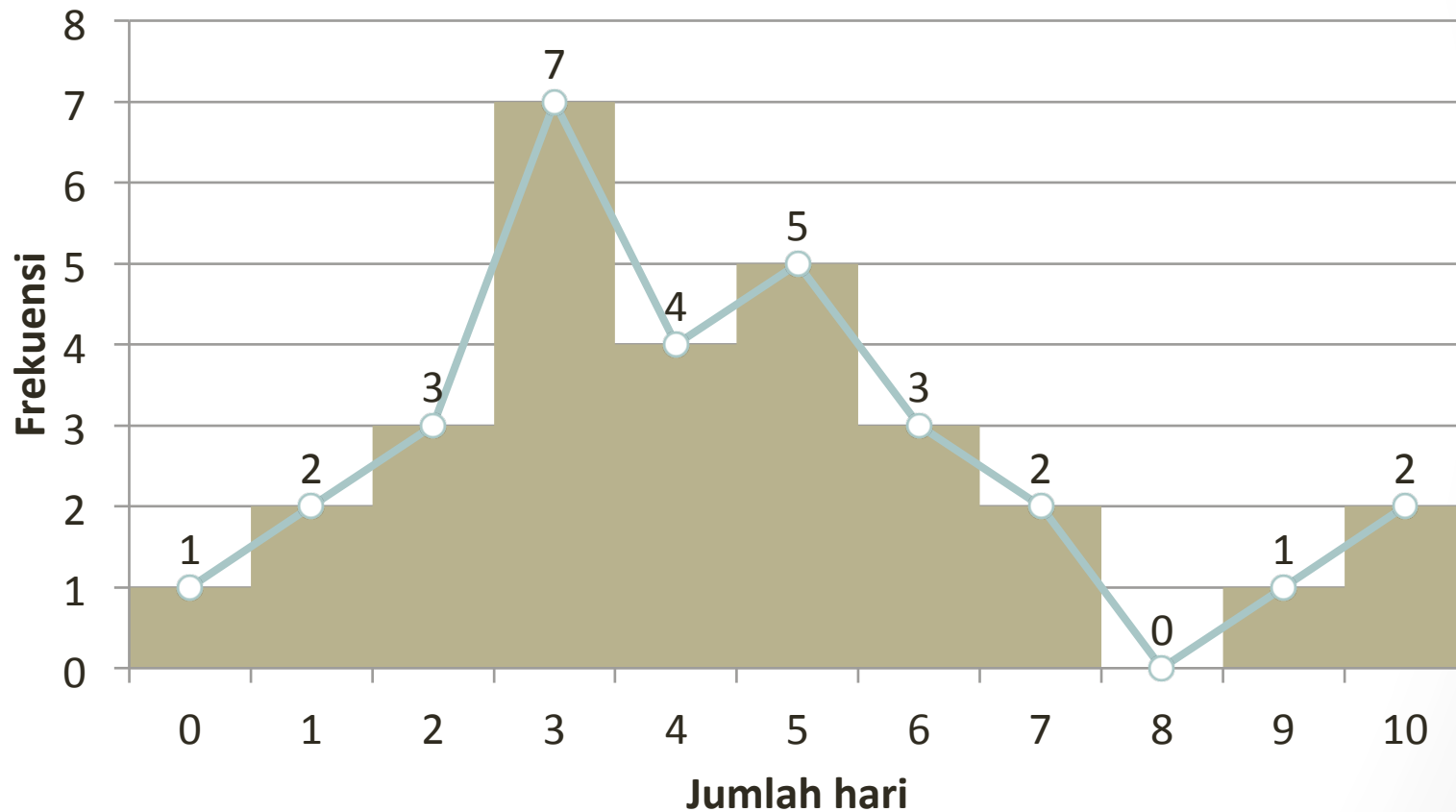
Histogram

Jumlah hari hujan per bulan selama 30 bulan



Histogram

Jumlah hari hujan per bulan selama 30 bulan



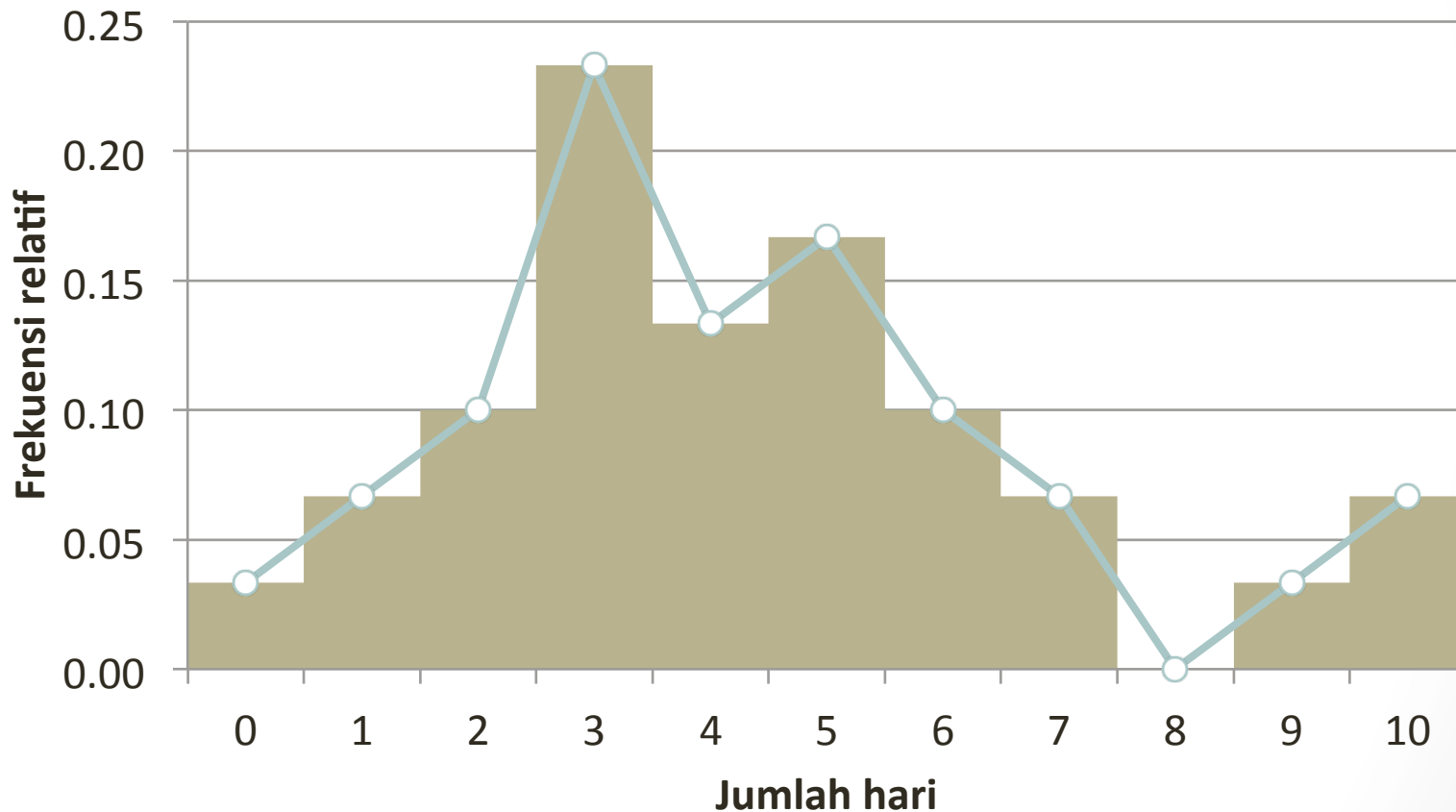
Probabilitas, Peluang Kejadian

| Jumlah hari hujan per bulan | Frekuensi | Frekuensi relatif |
|-----------------------------|-----------|-------------------|
| 10 | 2 | 0.07 |
| 9 | 1 | 0.03 |
| 8 | 0 | 0.00 |
| 7 | 2 | 0.07 |
| 6 | 3 | 0.10 |
| 5 | 5 | 0.17 |
| 4 | 4 | 0.13 |
| 3 | 7 | 0.23 |
| 2 | 3 | 0.10 |
| 1 | 2 | 0.07 |
| 0 | 1 | 0.03 |
| Jumlah | 30 | 1.00 |

untuk jumlah sampel yang besar, maka nilai frekuensi relatif dapat dipakai sebagai estimasi nilai probabilitas

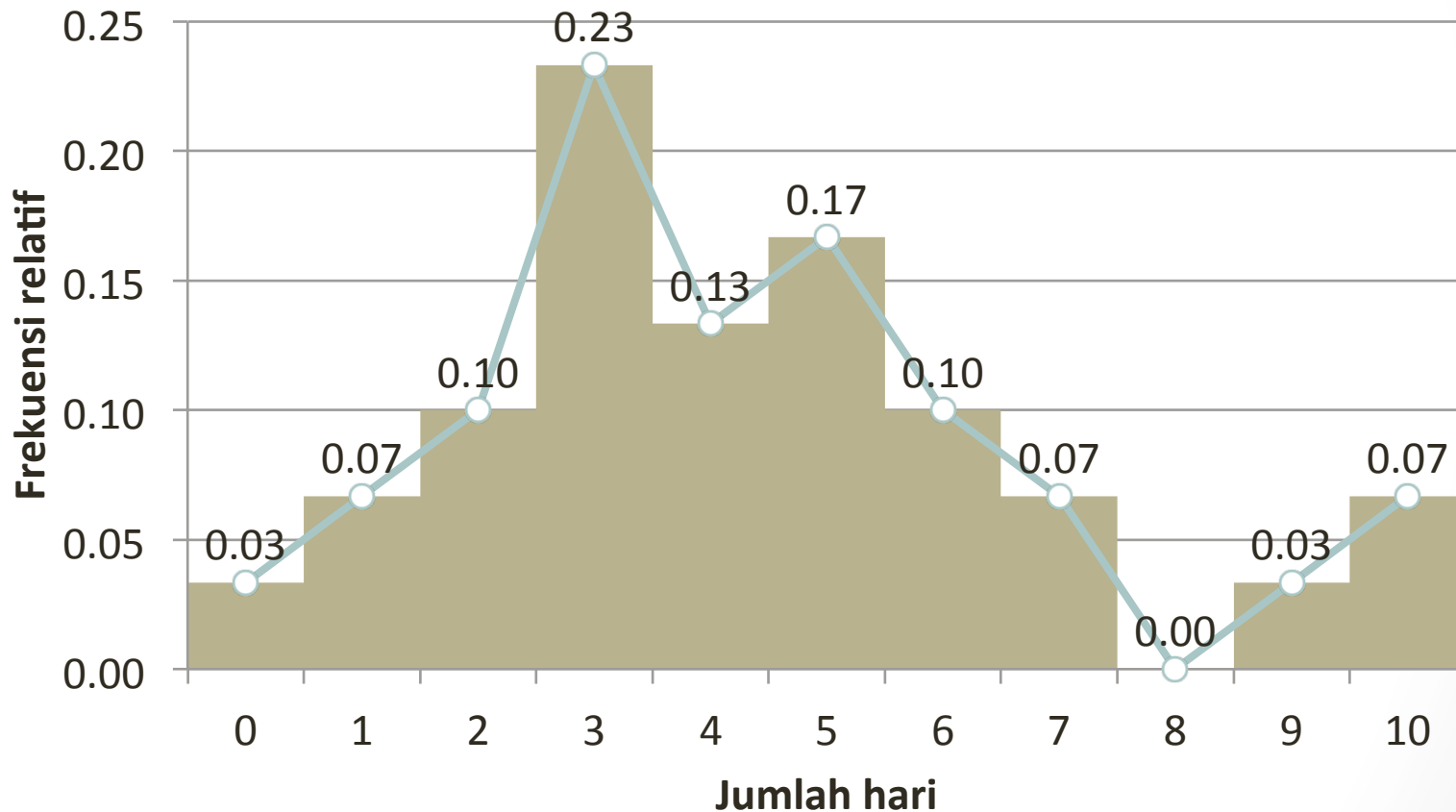
Probabilitas - Histogram

Jumlah hari hujan per bulan selama 30 bulan



Probabilitas - Histogram

Jumlah hari hujan per bulan selama 30 bulan



Contoh #2

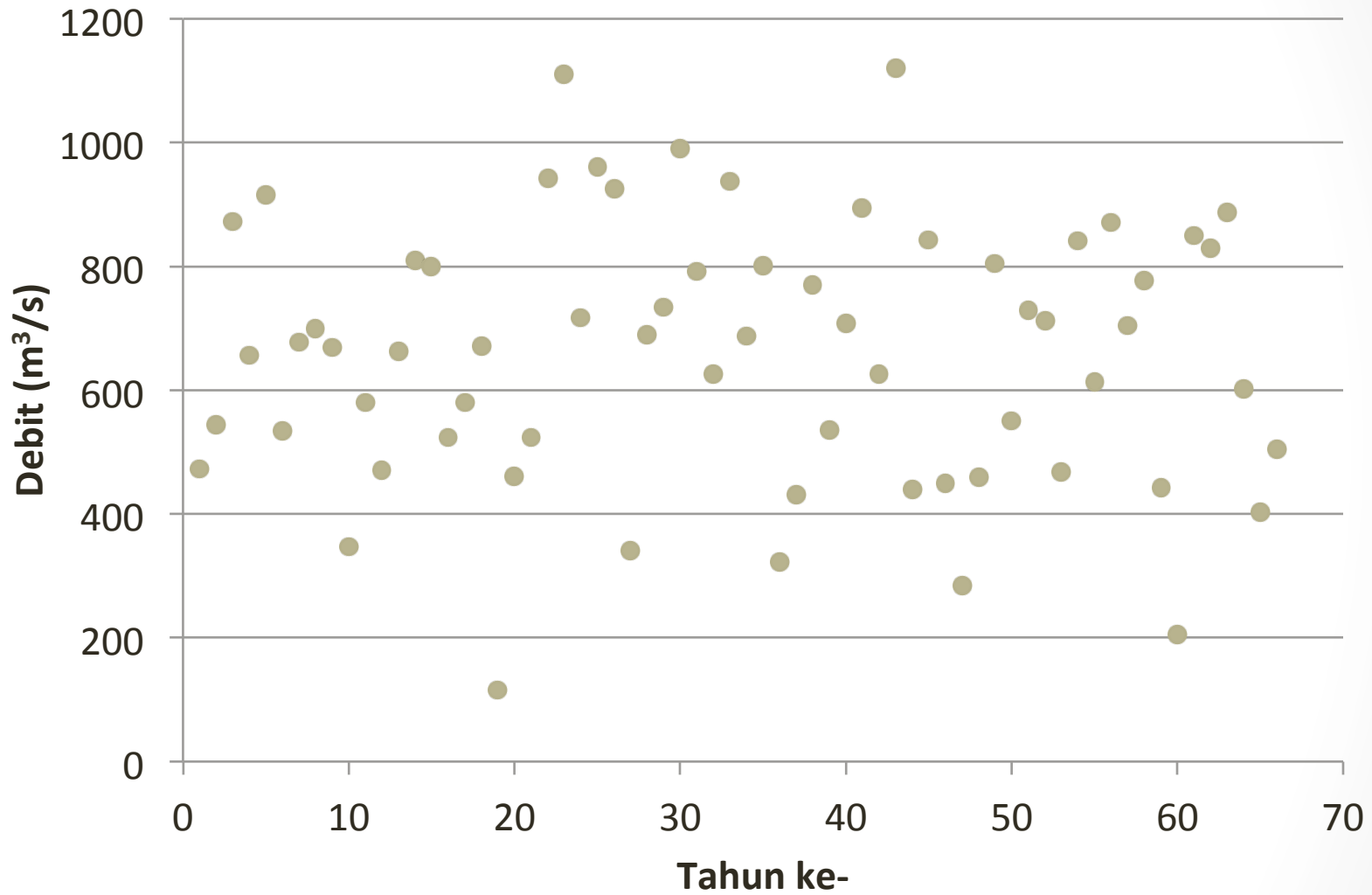
- Data debit puncak suatu sungai selama kurun 66 tahun
 - Debit dikelompokkan ke dalam klas dengan lebar interval tertentu
 - Frekuensi kejadian debit pada setiap klas dihitung

gunakan perintah fungsi MSEXcel: =FREQUENCY(...)

Debit puncak suatu Sungai XYZ selama 66 tahun

| Tahun ke- | Debit (m ³ /s) | Tahun ke- | Debit (m ³ /s) | Tahun ke- | Debit (m ³ /s) |
|-----------|---------------------------|-----------|---------------------------|-----------|---------------------------|
| 1 | 473 | 23 | 1110 | 45 | 843 |
| 2 | 544 | 24 | 717 | 46 | 450 |
| 3 | 872 | 25 | 961 | 47 | 284 |
| 4 | 657 | 26 | 925 | 48 | 460 |
| 5 | 915 | 27 | 341 | 49 | 804 |
| 6 | 535 | 28 | 690 | 50 | 550 |
| 7 | 678 | 29 | 734 | 51 | 729 |
| 8 | 700 | 30 | 991 | 52 | 712 |
| 9 | 669 | 31 | 792 | 53 | 468 |
| 10 | 347 | 32 | 626 | 54 | 841 |
| 11 | 580 | 33 | 937 | 55 | 613 |
| 12 | 470 | 34 | 687 | 56 | 871 |
| 13 | 663 | 35 | 801 | 57 | 705 |
| 14 | 809 | 36 | 323 | 58 | 777 |
| 15 | 800 | 37 | 431 | 59 | 442 |
| 16 | 523 | 38 | 770 | 60 | 206 |
| 17 | 580 | 39 | 536 | 61 | 850 |
| 18 | 672 | 40 | 708 | 62 | 829 |
| 19 | 115 | 41 | 894 | 63 | 887 |
| 20 | 461 | 42 | 626 | 64 | 602 |
| 21 | 524 | 43 | 1120 | 65 | 403 |
| 22 | 943 | 44 | 440 | 66 | 505 |

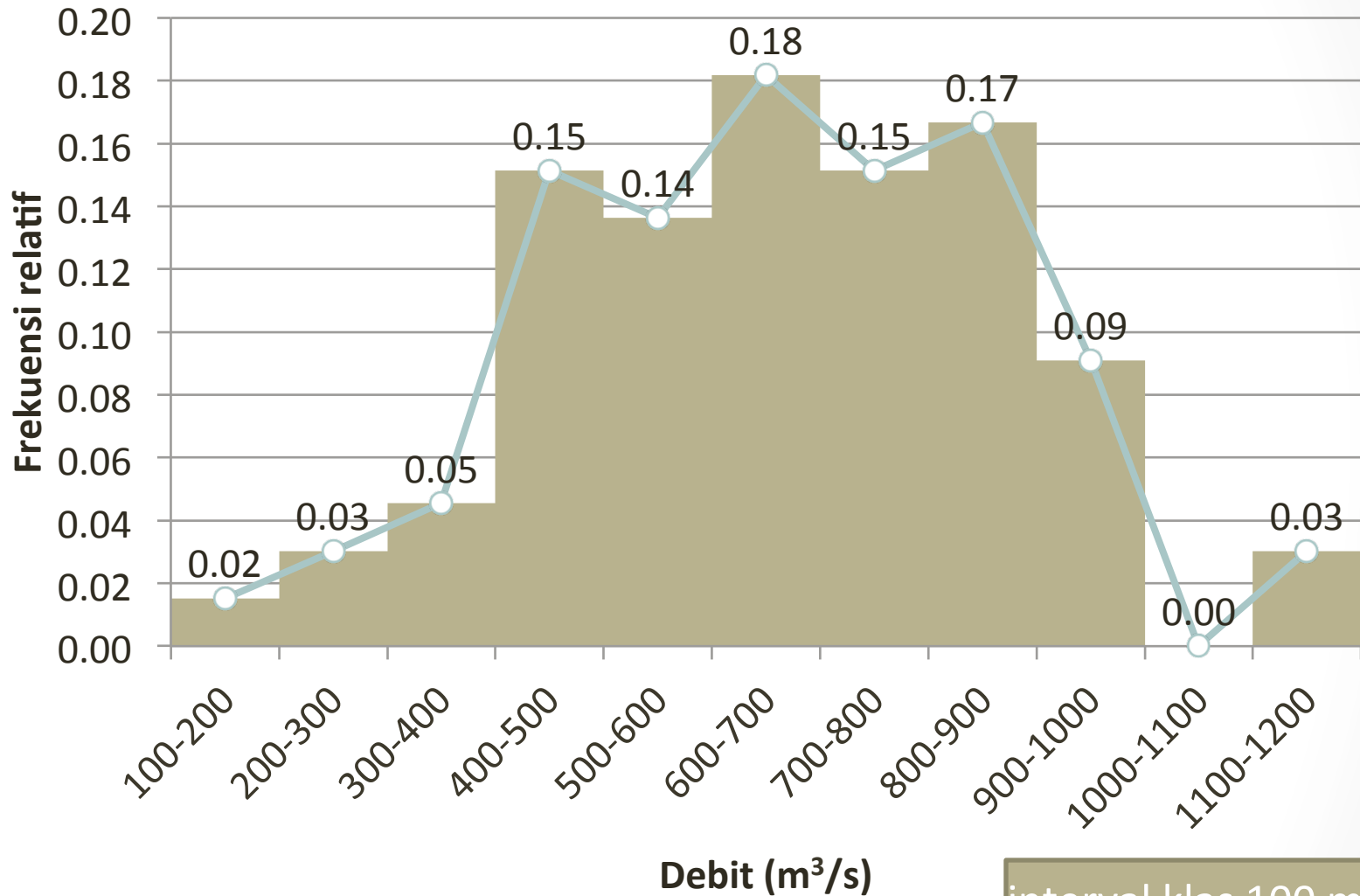
Debit puncak tahunan suatu sungai selama 66 tahun



Tabel Frekuensi

| Interval Klas | Klas | Frekuensi | Frekuensi relatif | Frek rel kumulatif |
|---------------|----------------------------|-----------|-------------------|--------------------|
| 100 – 200 | 150 | 1 | 0.02 | 0.02 |
| 200 – 300 | 250 | 2 | 0.03 | 0.05 |
| 300 – 400 | 350 | 3 | 0.05 | 0.09 |
| 400 – 500 | 450 | 10 | 0.15 | 0.24 |
| 500 – 600 | 550 | 9 | 0.14 | 0.38 |
| 600 – 700 | 650 | 12 | 0.18 | 0.56 |
| 700 – 800 | 750 | 10 | 0.15 | 0.71 |
| 800 – 900 | 850 | 11 | 0.17 | 0.88 |
| 900 – 1000 | 950 | 6 | 0.09 | 0.97 |
| 1000 – 1100 | 1050 | 0 | 0.00 | 0.97 |
| 1100 – 1200 | 1150 | 2 | 0.03 | 1.00 |
| | Σ | 66 | 1.00 | |

Debit puncak tahunan suatu sungai selama 66 tahun

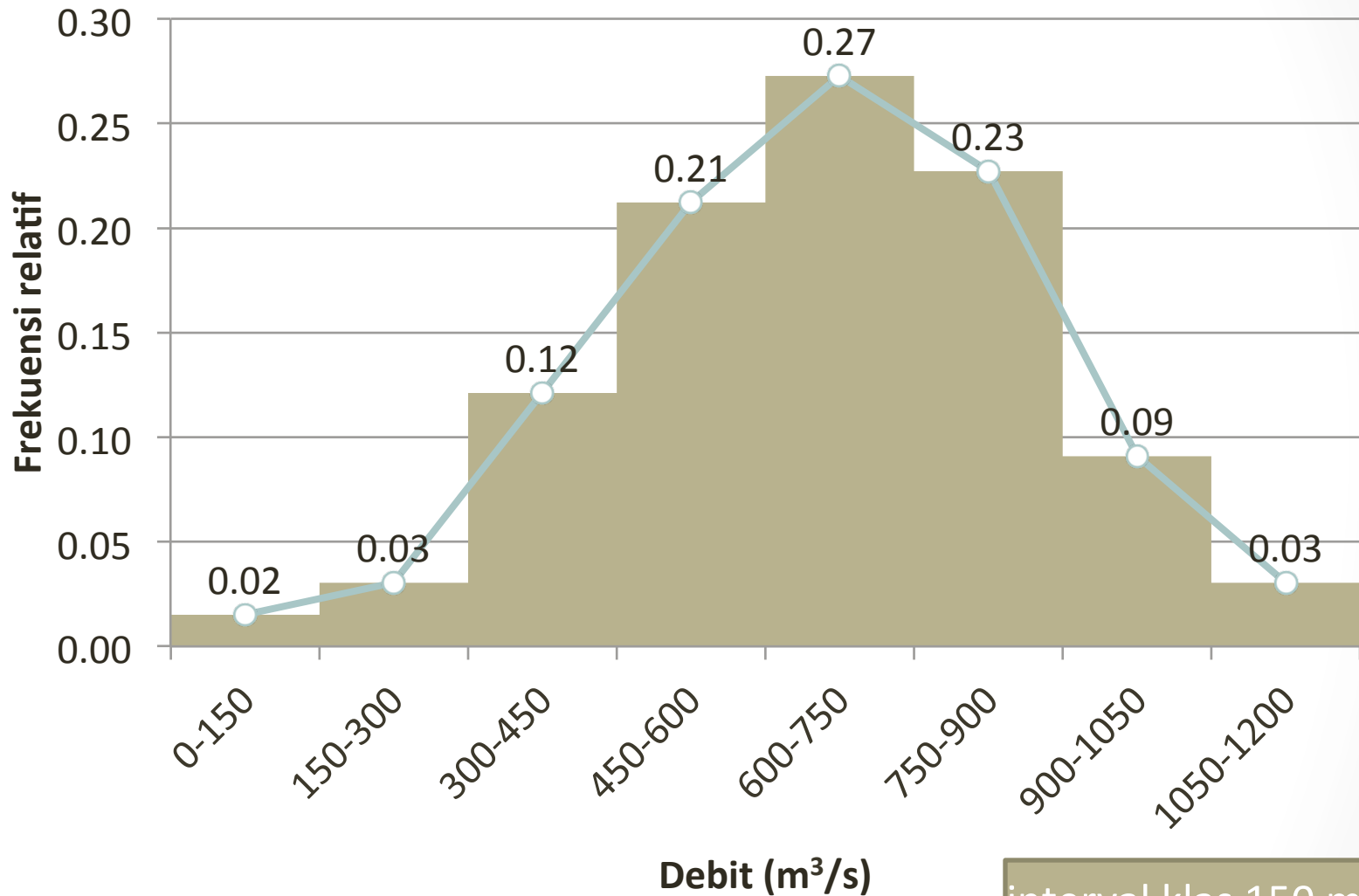


interval klas 100 m³/s

Tabel Frekuensi

| Interval Klas | Klas | Jumlah | Frekuensi relatif | Frek rel kumulatif |
|---------------|----------------------------|-----------|-------------------|--------------------|
| 0 – 150 | 75 | 1 | 0.02 | 0.02 |
| 150 – 300 | 225 | 2 | 0.03 | 0.05 |
| 300 – 450 | 375 | 8 | 0.12 | 0.17 |
| 450 – 600 | 525 | 14 | 0.21 | 0.38 |
| 600 – 750 | 675 | 18 | 0.27 | 0.65 |
| 750 – 900 | 825 | 15 | 0.23 | 0.88 |
| 900 – 1050 | 975 | 6 | 0.09 | 0.97 |
| 1050 – 1200 | 1125 | 2 | 0.03 | 1.00 |
| | Σ | 66 | 1.00 | |

Debit puncak tahunan suatu sungai selama 66 tahun



interval klas 150 m³/s

Klas vs Nilai Parameter Statistika

- Adakah pengaruh pengelompokan data terhadap nilai-nilai parameter statistika?
 - Rata-rata
 - Simpangan baku

Terima kasih