PEMBAHASAN SOAL UTS STATISTIKA 2022/2023

1.

Kecepatan (mil/jam)	Frekuensi	Nilai Tengah (Xi)	Xi.fi	f_k (frekuensi kumulatif)
59-63	3	61	183	3
64-68	14	66	924	17
69-73	13	71	923	30
74-78	5	76	380	35
79-83	4	81	324	39
84-88	1	86	86	40
	$\sum f_i = 40$		$\sum x_i \cdot f_i = 2820$	

$$\bar{x} = \frac{\sum x_i \cdot f_i}{\sum f_i} = \frac{2820}{40} = 70,5$$

Jadi, Mean = 70,5

Frekuensi terbesar yaitu pada interval 64-68 atau kelas 2
Tepi bawah kelas modus yaitu
$$TB = 64 - 0,5 = 63,5$$
Selisih frekuensi kelas modus dengan sebelum kelas modus
$$d1 = 14 - 3 = 11$$
Selisih frekuensi kelas modus dengan setelah kelas modus
$$d2 = 14 - 13 = 1$$
Interval kelas C
$$p = 68,5 - 63,5 = 5$$
$$Mo = TB + \frac{d1}{d1 + d2}p = 63,5 + \frac{11}{11+1}.5 = 63,5 + \frac{11}{12}.5 = 68,0833$$

Jadi, Modus = 68,0833

Kuartil I
Letak $Q_i = \frac{i}{4}(n)$

$$Q_1 = \frac{1}{4}(40)$$

$$Q_1 = 10$$
Karena letak kuartil pertamanya 10, maka kuartil tersebut berada di interval 64-68
Tepi bawah kuartil ke-1
$$TB_1 = 64 - 0,5 = 63,5$$
Panjang data
$$P = 68 - 63 = 5$$

$$Q_1 = TB_1 + p\left(\dfrac{\dfrac{i}{4}n - f_k}{f}\right)$$

$$= 63,5 + 5\left(\dfrac{\dfrac{40}{4} - 3}{14}\right)$$

$$= 63,5 + 5\left(\dfrac{10 - 3}{14}\right)$$

$$= 63,5 + \left(\dfrac{35}{14}\right)$$

$$= 63,5 + 2,5$$

$$= 66$$

Jadi, kuartil ke − 1 data tersebut adalah 66

2. Gangguan sinyal

   P(Tengah Kota)   = 0,2

   P(Kaki Bukit)   = 0,3

   P(Tepi Pantai)   = 0,5

   P(G|Tengah Kota)   = 0,05

   P(G|Kaki Bukit)   = 0,06

   P(G|Tepi Pantai)   = 0,08

   a. P(G) = P(G|Tengah kota) x P(Tengah kota) + P(G|Kaki bukit) x P(Kaki bukit) + P(G|Tepi pantai) x P(Tepi pantai)

   P(G) = (0.05 x 0.2) + (0.06 x 0.3) + (0.08 x 0.5)

   P(G) = 0.01 + 0.018 + 0.04

   P(G) = 0.068

   b. P(OTP) => Peluang operator telah membangun pemancar di tepi pantai

   P(OTP) = (P(G|Tepi pantai) x P(Tepi pantai))/P(G)

   P(OTP) = 0.04 / 0.068

   P(OTP) = 0.588

3. Kemungkinan balita tidak diimunisasi campak $p = \frac{1}{5}$

Kemungkinan balita diimunisasi campak adalah $(1 - p) = \frac{4}{5}$

Jumlah bayi $= 5$

    a. 2 orang belum mendapatkan imunisasi campak

$$p(x, n, p) = \binom{n}{x} p^x (1 - p)^{n-x}$$

$$p\left(2, 5, \frac{1}{5}\right) = \binom{5}{2}\left(\frac{1}{5}\right)^2 \left(\frac{4}{5}\right)^3$$

$$p\left(2, 5, \frac{1}{5}\right) = \frac{5!}{(5-2)!\,2!}\left(\frac{1}{5}\right)^2 \left(\frac{4}{5}\right)^3$$

$$p\left(2, 5, \frac{1}{5}\right) = \frac{5!}{3!\,2!}\left(\frac{1}{5}\right)^2 \left(\frac{4}{5}\right)^3$$

$$p\left(2, 5, \frac{1}{5}\right) = \frac{5 \times 4 \times 3!}{3!\,2!}\left(\frac{1}{5}\right)^2 \left(\frac{4}{5}\right)^3$$

$$p\left(2, 5, \frac{1}{5}\right) = \frac{5 \times 4}{2 \times 1}\left(\frac{1}{25}\right)\left(\frac{64}{125}\right)$$

$$p\left(2, 5, \frac{1}{5}\right) = 10\left(\frac{1}{25}\right)\left(\frac{64}{125}\right)$$

$$p\left(2, 5, \frac{1}{5}\right) = 2\left(\frac{1}{5}\right)\left(\frac{64}{125}\right)$$

$$p\left(2, 5, \frac{1}{5}\right) = \frac{128}{625}$$

$$p\left(2, 5, \frac{1}{5}\right) = 0{,}2048$$

    b. Paling sedikit 3 orang belum mendapat vaksin

$$p(x \geq 3) = 1 - p(x < 3)$$

$$p(x \geq 3) = 1 - 0{,}9421$$

$$p(x \geq 3) = 0.0579$$

4. Diketahui:

Jumlah siswa = 300

Rata-rata = 70

Variansi = 9

Syarat mendapat A: $nilai > 80$

Syarat mendapat B : $70 < nilai < 80$

    a. Mahasiswa yang mendapat nilai A

$$z = \frac{X - 70}{9}$$

$$z = \frac{80 - 70}{9}$$

$$z = 1.11$$

$$P(x > 80) = p(z > 1.11)$$
$$= 0.5 - 0.3665$$
$$= 0.1335$$

    b. Mahasiswa yang mendapat nilai B

Untuk $x = 80$

$$z = \frac{X - 70}{9}$$

$$z = \frac{80 - 70}{9}$$

$$z = 1.11$$

Untuk $x = 70$

$$z = \frac{X - 70}{9}$$

$$z = \frac{70 - 70}{9}$$

$$z = 0$$

$$P(70 < x < 80) = p(z < 0) + p(z < 1.11)$$
$$= 0 + 0.3643$$
$$= 0.3643$$

5. Diketahui:

n = 1000 unit

$p = 0,5\% = 0,005 = \dfrac{5}{1000} = \dfrac{1}{200}$

a. Probabilitas 5 chipset rusak dalam satu hari

$$p(x, n, p) = \binom{n}{x} p^x (1-p)^{n-x}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \binom{1000}{5}\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \left(\frac{1000!}{5!\,(1000-5)!}\right)\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \left(\frac{1000!}{5!\,995!}\right)\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \left(\frac{1000 \times 999 \times 998 \times 997 \times 996 \times 995!}{5!\,995!}\right)\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \left(\frac{1000 \times 999 \times 998 \times 997 \times 996}{5 \times 4 \times 3 \times 2 \times 1}\right)\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = \left(\frac{1000 \times 999 \times 998 \times 997 \times 996}{5 \times 4 \times 3 \times 2 \times 1}\right)\left(\frac{1}{200}\right)^5 \left(\frac{199}{200}\right)^{995}$$

$$p\left(5, 1000, \frac{1}{200}\right) = 0.1759$$

b. Probabilitas paling banyak 5 chipset rusak dalam satu hari

$$p(x \leq 5) = p(x = 1) + p(x = 2) + p(x = 3) + p(x = 4) + p(x = 5)$$
$$p(x \leq 5) = p(x = 1) + p(x = 2) + p(x = 3) + p(x = 4) + p(x = 5)$$
$$p(x \leq 5) = 0.0334 + 0.0839 + 0,1403 + 0,1757 + 0,1759$$
$$p(x \leq 5) = 0.6093$$