

EXERCÍCIO 2

QUADRO I

Classes	Frequências observadas o_i	$p_{oi}=P(A_i H_0)$	Frequências esperadas $e_i=60 p_{oi}$
$A_0=\{0\}$	2	$f_0(0)=(e^{-3.8} \times 3.8^0)/0!=0.0224$	1.344 <5
$A_1=\{1\}$	4	$f_0(1)=(e^{-3.8} \times 3.8^1)/1!=0.085$	5.1
$A_2=\{2\}$	8	$f_0(2)=(e^{-3.8} \times 3.8^2)/2!=0.1615$	9.69
$A_3=\{3\}$	13	$f_0(3)=(e^{-3.8} \times 3.8^3)/3!=0.2046$	12.276
$A_4=\{4\}$	14	$f_0(4)=0.1944$	11.664
$A_5=\{5\}$	9	$f_0(5)=0.1477$	8.862
$A_6=\{6\}$	5	$f_0(6)=0.0936$	5.616
$A_7=\{7\}$	3	$f_0(7)=0.0508$	3.048 <5
$A_8=\{8\}$	1	$f_0(8)=0.0241$	1.446 <5
$A_9=\{9\}$	1	$f_0(9)=0.0102$	0.612 <1
$A_{10}=\{10,11,\dots\}$	0	$f_0(10)+ f_0(11)+\dots =0.0057$	0.342 <1

QUADRO II

Classes	Frequências observadas o_i	Frequências esperadas $e_i=60 p_{oi}$	o_i-e_i	$(o_i-e_i)^2/e_i$
$A_0=\{0\}$	2	1.344	0.666	0.33
$A_1=\{1\}$	4	5.1	-1.1	0.2373
$A_2=\{2\}$	8	9.69	-1.69	0.2947
$A_3=\{3\}$	13	12.276	0.724	0.0427
$A_4=\{4\}$	14	11.664	2.336	0.4678
$A_5=\{5\}$	9	8.862	0.138	0.0021
$A_6=\{6\}$	5	5.616	-0.616	0.0676
$A_7=\{7,8,9, \dots\}$	5	5.448	-0.448	0.0368
Total	60	60		1.479

Exercício 3, alínea b

Quadro: cálculo do valor observado da Estatística D_n

x_i	$\hat{F}_{20}(x_i)$	$\hat{F}_{20}(x_i^-)$	$F_0(x_i)$	$ F_0(x_i) - \hat{F}_{20}(x_i) $	$ F_0(x_i) - \hat{F}_{20}(x_i^-) $
6.426	0.05	0.00	0.0367	0.0133	0.0367
7.542	0.10	0.05	0.1093	0.0093	0.0593
8.950	0.15	0.10	0.2981	0.1481	0.1981=d₂₀
8.974	0.20	0.15	0.3050	0.1050	0.1550
8.984	0.25	0.20	0.3050	0.0550	0.1050
9.028	0.30	0.25	0.3121	0.0121	0.0621
9.036	0.35	0.30	0.3156	0.0344	0.0156
9.354	0.40	0.35	0.3745	0.0255	0.0245
9.478	0.45	0.40	0.3974	0.0526	0.0026
9.864	0.50	0.45	0.4721	0.0279	0.0221
9.886	0.55	0.50	0.4761	0.0739	0.0239
10.274	0.60	0.55	0.5557	0.0443	0.0057
10.928	0.65	0.60	0.6772	0.0272	0.0772
11.190	0.70	0.65	0.7257	0.0257	0.0757
11.762	0.75	0.70	0.8106	0.0606	0.1106
11.812	0.80	0.75	0.8186	0.0186	0.0686
12.092	0.85	0.80	0.8531	0.0031	0.0531
12.474	0.90	0.85	0.8925	0.0075	0.0425
13.356	0.95	0.90	0.9535	0.0035	0.0535
14.910	1.00	0.95	0.9931	0.0069	0.0431

onde,

$$F_0(6.426) = P\left(Z < \frac{6.426 - 10}{2}\right) = P(Z < -1.787) = 1 - P(Z < 1.787) = 1 - 0.9633 = 0.0367$$

$$F_0(7.542) = P\left(Z < \frac{7.542 - 10}{2}\right) = P(Z < -1.229) = 1 - P(Z < 1.23) = 1 - 0.8907 = 0.1093$$

$$F_0(8.95) = P\left(Z < \frac{8.95 - 10}{2}\right) = P(Z < -0.525) = 1 - P(Z < 0.53) = 1 - 0.7019 = 0.2981$$

$$F_0(8.974) = P\left(Z < \frac{8.974 - 10}{2}\right) = P(Z < -0.51) = 1 - P(Z < 0.51) = 1 - 0.695 = 0.305$$

$$F_0(8.984) = P\left(Z < \frac{8.984 - 10}{2}\right) = P(Z < -0.51) = 1 - P(Z < 0.51) = 1 - 0.695 = 0.305$$

$$F_0(9.028)=P\left(Z < \frac{9.028-10}{2}\right)=P(Z < -0.49)=1-P(Z < 0.49)=1-0.6879=0.3121$$

$$F_0(9.036)=P\left(Z < \frac{9.036-10}{2}\right)=P(Z < -0.48)=1-P(Z < 0.48)=1-0.6844=0.3156$$

$$F_0(9.354)=P\left(Z < \frac{9.354-10}{2}\right)=P(Z < -0.32)=1-P(Z < 0.32)=1-0.6255=0.3745$$

$$F_0(9.478)=P\left(Z < \frac{9.478-10}{2}\right)=P(Z < -0.26)=1-P(Z < 0.26)=1-0.6026=0.3974$$

$$F_0(9.864)=P\left(Z < \frac{9.864-10}{2}\right)=P(Z < -0.07)=1-P(Z < 0.407)=1-0.5279=0.4721$$

$$F_0(9.886)=P\left(Z < \frac{9.886-10}{2}\right)=P(Z < -0.06)=1-P(Z < 0.06)=1-0.5239=0.4761$$

$$F_0(10.274)=P\left(Z < \frac{10.274-10}{2}\right)=P(Z < 0.14)=0.5557$$

$$F_0(10.928)=P\left(Z < \frac{10.928-10}{2}\right)=P(Z < 0.46)=0.6772$$

$$F_0(11.19)=P\left(Z < \frac{11.19-10}{2}\right)=P(Z < 0.6)=0.7257$$

$$F_0(11.762)=P(Z < 0.88)=0.8106$$

$$F_0(11.812)=P(Z < 0.91)=0.8186$$

$$F_0(12.092)=P(Z < 1.05)=0.8531$$

$$F_0(12.474)=P(Z < 1.24)=0.8925$$

$$F_0(13.356)=P(Z < 1.68)=0.9535$$

$$F_0(14.91)=P(Z < 2.46)=0.9931$$

Exercício 4, alínea b

Quadro: cálculo do valor observado da Estatística D_n

X_i	z_i	$\hat{F}_{48}(z_i)$	$\hat{F}_{48}(z_i^-)$	$F_0(z_i) = P(Z \leq z_i)$	$ F_0(z_i) - \hat{F}_{48}(z_i) $	$ F_0(z_i) - \hat{F}_{48}(z_i^-) $
34	-1.6768	0.0208	0	0.0465	0.0256	0.0465
35	-1.5689	0.0417	0.0208	0.0582	0.0165	0.0374
36	-1.4610	0.0833	0.0417	0.0721	0.0112	0.0305
37	-1.3531	0.1042	0.0833	0.0885	0.0157	0.0052
39	-1.1373	0.1250	0.1042	0.1271	0.0021	0.0230
40	-1.0295	0.2083	0.1250	0.1515	0.0568	0.0265
42	-0.8137	0.2500	0.2083	0.2090	0.0410	0.0006
43	-0.7058	0.2708	0.2500	0.2389	0.0320	0.0111
44	-0.5979	0.2917	0.2708	0.2743	0.0174	0.0034
46	-0.3821	0.3750	0.2917	0.3520	0.0230	0.0603
47	-0.2742	0.4375	0.3750	0.3936	0.0439	0.0186
48	-0.1663	0.5000	0.4375	0.4325	0.0675	0.0050
49	-0.0584	0.5625	0.5000	0.4761	0.0864	0.0239
50	0.0494	0.6042	0.5625	0.5199	0.0842	0.0426
51	0.1573	0.6458	0.6042	0.5636	0.0823	0.0406
52	0.2652	0.6667	0.6458	0.6064	0.0602	0.0394
53	0.3731	0.7292	0.6667	0.6443	0.0849	0.0224
56	0.6968	0.7500	0.7292	0.7580	0.0080	0.0289
58	0.9126	0.7917	0.7500	0.8186	0.0269	0.0686
59	1.0205	0.8333	0.7917	0.8461	0.0128	0.0545
60	1.1283	0.8958	0.8333	0.8708	0.0251	0.0374
61	1.2362	0.9167	0.8958	0.8925	0.0242	0.0033
62	1.3441	0.9375	0.9167	0.9099	0.0276	0.0068
63	1.4520	0.9583	0.9375	0.9265	0.0319	0.0110
67	1.8836	0.9792	0.9583	0.9699	0.0092	0.0116
78	3.0704	1.0000	0.9792	0.9989	0.0011	0.0198

EXERCÍCIO 11

Quadro I

x_i	$\hat{F}_{10}(x_i)$	$\hat{F}_{10}(x_i^-)$	$F_0(x_i)$	$ F(x_i) - \hat{F}_{10}(x_i) $	$ F(x_i) - \hat{F}_{10}(x_i^-) $
490	0.1	0	0.0250	0.0750	0.0250
497	0.2	0.10	0.2776	0.0776	0.1776
499	0.3	0.2	0.4207	0.1207	0.2207
501.5	0.4	0.3	0.6141	0.2141	0.3141
502.5	0.5	0.4	0.6879	0.1879	0.2879
507	0.7	0.5	0.9147	0.2147	0.4147
510	0.9	0.7	0.9750	0.0750	0.2750
510.5	1	0.9	0.9803	0.0197	0.0803

$$F_0(490) = P\left(Z < \frac{490 - 500}{5.1}\right) = P(Z < -1.96) = 1 - 0.975 = 0.025;$$

$$F_0(497) = P\left(Z < \frac{497 - 500}{5.1}\right) = P(Z < -0.59) = 1 - 0.7224 = 0.2776;$$

$$F_0(499) = P\left(Z < \frac{499 - 500}{5.1}\right) = P(Z < -0.2) = 1 - 0.5793 = 0.4207;$$

$$F_0(501.5) = P\left(Z < \frac{501.5 - 500}{5.1}\right) = P(Z < 0.29) = 0.6141;$$

⋮

EXERCÍCIO 12

Quadro I

x_i	z_i	$\hat{F}_{20}(z_i)$	$\hat{F}_{20}(z_i^-)$	$F_0(z_i)$	$ F_0(z_i) - \hat{F}_{20}(z_i) $	$ F_0(z_i) - \hat{F}_{20}(z_i^-) $
-10.813	-1.32	0.1	0	0.0934	0.0066	0.0934
-7.78	-0.95	0.2	0.1	0.1711	0.0289	0.0711
-5.641	-0.69	0.3	0.2	0.2451	0.0549	0.0451
-5.593	-0.68	0.4	0.3	0.2483	0.1517	0.0517
-4.861	-0.59	0.5	0.4	0.2776	0.2224	0.1224
-0.201	-0.02	0.6	0.5	0.4920	0.1080	0.0080
4.297	0.52	0.7	0.6	0.6985	0.0015	0.0985
7.58	0.92	0.8	0.7	0.8212	0.0212	0.1212
10.78	1.31	0.9	0.8	0.9049	0.0049	0.1049
12.232	1.49	1	0.9	0.9319	0.0681	0.0319

$$F_0(-1.32) = P(Z < -1.32) = 1 - 0.9066 = 0.0934;$$

$$F_0(-0.95) = P(Z < -0.95) = 1 - 0.8289 = 0.1711;$$

$$F_0(-0.68) = P(Z < -0.68) = 1 - 0.7517 = 0.2483;$$

$$F_0(-0.69) = P(Z < -0.69) = 1 - 0.7549 = 0.2451;$$

⋮

Exercício 13

Quadro: cálculo do valor observado da Estatística D_n^*

x_i	z_i	$\hat{F}_{200}(z_i)$	$\hat{F}_{200}(z_i^-)$	$F_0(z_i) = P(Z \leq z_i)$	$ F_0(z_i) - \hat{F}_{200}(z_i) $	$ F_0(z_i) - \hat{F}_{200}(z_i^-) $
5	-1.621	0.075	0	0.0526	0.0224	0.0526
7	-1.196	0.205	0.075	0.1151	0.0899	0.0401
9	-0.7712	0.33	0.205	0.2206	0.1094	0.0156
11	-0.3463	0.48	0.33	0.3632	0.1168	0.0332
13	0.0786	0.61	0.48	0.5319	0.0781	0.0519
15	0.5035	0.715	0.61	0.6915	0.0235	0.0815
17	0.9284	0.835	0.715	0.8238	0.0112	0.1088
19	1.3533	0.935	0.835	0.9115	0.0235	0.0765
21	1.7782	1	0.935	0.9633	0.0367	0.0283

Exercício 14

Quadro: cálculo do valor observado da Estatística D_n^*

x_i	z_i	$\hat{F}_{80}(z_i)$	$\hat{F}_{80}(z_i^-)$	$F_0(z_i) = P(Z \leq z_i)$	$ F_0(z_i) - \hat{F}_{80}(z_i) $	$ F_0(z_i) - \hat{F}_{80}(z_i^-) $
20	-2.53	0.025	0	0.0057	0.0195	0.0055
22	-1.9	0.0625	0.025	0.0287	0.0338	0.0037
23	-1.58	0.175	0.0625	0.0571	0.1179	0.0054
26	-0.63	0.325	0.175	0.2643	0.0607	0.0893
29	0.32	0.6625	0.325	0.6255	0.037	0.3005
30	0.64	0.8625	0.6625	0.7389	0.1236	0.0764
31	0.96	0.95	0.8625	0.8315	0.1185	0.031
33	1.59	0.975	0.95	0.9441	0.0309	0.0059
34	1.91	1	0.975	0.9719	0.0281	0.0031

