AA05 - Métodos Numéricos Computacionais

Guilherme Brizzi

1 Questão 1

k	x_k	y_k	x_k^2	x_k^3	x_k^4	$y_k x_k$	$y_k x_k^2$
1	5.16	23.68	26.6256	137.388	708.923	122.189	630.494
2	7.76	32.64	60.2176	467.289	3626.16	253.286	1965.5
3	9.289	32.79	86.2855	801.506	7445.19	304.586	2829.3
4	11.34	44.09	128.596	1458.27	16536.8	499.981	5669.78
5	12.59	41.49	158.508	1995.62	25124.8	522.359	6576.5
6	15.01	52.55	225.3	3381.75	50760.1	788.775	11839.5
7	17.22	60.26	296.528	5106.22	87929.1	1037.68	17868.8
8	18.84	62.55	354.946	6687.18	125986	1178.44	22201.8
9	21.54	73.22	463.972	9993.95	215270	1577.16	33972
10	23.42	74.54	548.496	12845.8	300848	1745.73	40884.9
Σ	142.169	497.81	2349.47	42875	834235	8030.18	144439

Ajuste Linear

$a_0 = 8.51399$

$a_1 = 2.90267$

Ajuste Quadrático

$10a_0 + 142.169a_1 + 2349.47a_2 = 497.81$

$142.169a_0 + 2349.47a_1 + 42875a_2 = 8030.18$

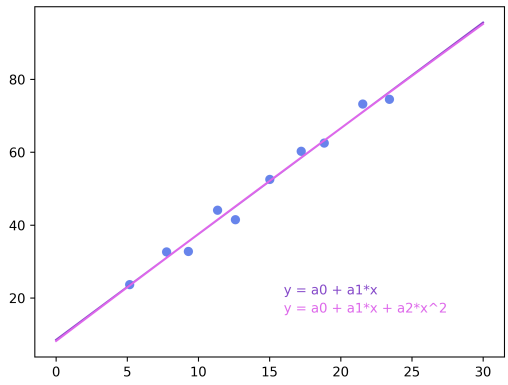
$2349.47a_0 + 42875a_1 + 834235a_2 = 144439$

$a_0 = 8.18435$

$a_1 = 2.95694$

$a_2 = -0.00188043$

Gráfico



2 Questão 2

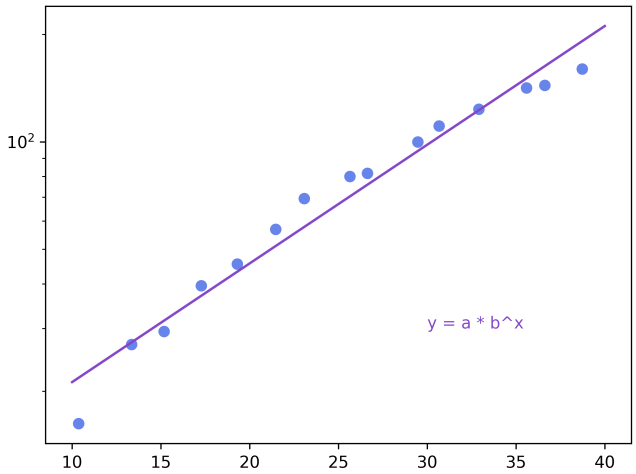
2.1 Ajuste Exponencial

k	x_k	$logy_k$	x_k^2	$x_k logy_k$
1	10.36	2.78686	107.33	28.8719
2	13.35	3.29769	178.222	44.0241
3	15.18	3.38201	230.432	51.339
4	17.27	3.67731	298.253	63.5072
5	19.3	3.81705	372.49	73.6691
6	21.46	4.04094	460.532	86.7187
7	23.07	4.23974	532.225	97.8109
8	25.64	4.38215	657.41	112.358
9	26.63	4.40244	709.157	117.237
10	29.47	4.60517	868.481	135.714
11	30.67	4.70773	940.649	144.386
12	32.91	4.81624	1083.07	158.502
13	35.59	4.95301	1266.65	176.277
14	36.62	4.96981	1341.02	181.995
15	38.73	5.0758	1500.01	196.586
Σ	376.25	63.154	10545.9	1669

Ajuste Linear
$a_0 = 2.28918$
$a_1 = 0.0765881$

Ajuste Exponencial
$a = e^{a_0} = 9.86684$
$b = e^{a_1} = 1.0796$

Gráfico



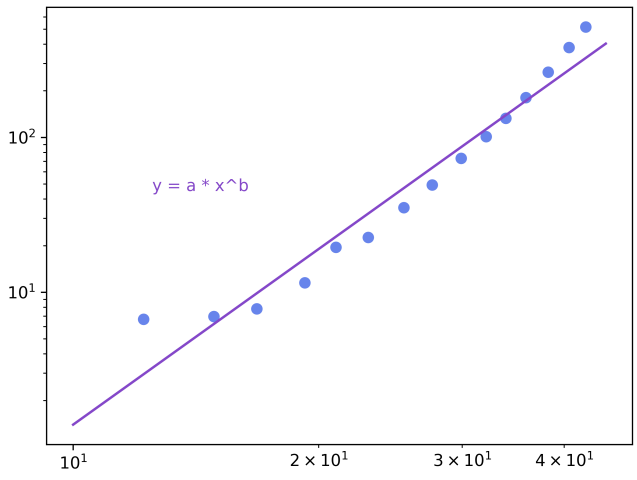
2.2 Ajuste Potência

k	$logx_k$	$logy_k$	log^2x_k	$logy_k logx_k$
1	2.50144	1.90076	6.25718	4.75464
2	2.70002	1.9419	7.2901	5.24317
3	2.82138	2.05566	7.96018	5.7998
4	2.95699	2.44322	8.7438	7.22457
5	3.04452	2.9699	9.26912	9.04193
6	3.13593	3.11839	9.83405	9.77906
7	3.23632	3.56133	10.4738	11.5256
8	3.31673	3.89853	11.0007	12.9304
9	3.39819	4.29456	11.5477	14.5937
10	3.46854	4.6171	12.0308	16.0146
11	3.52459	4.89035	12.4228	17.2365
12	3.58102	5.1985	12.8237	18.6159
13	3.64414	5.57595	13.2798	20.3196
14	3.70303	5.94122	13.7124	22.0005
15	3.74997	6.24591	14.0623	23.422
Σ	48.7828	58.6533	160.708	198.502

Ajuste Linear
$a_0 = -8.34083$
$a_1 = 3.76702$

Ajuste Potência
$a = e^{a_0} = 0.000238573$
$b = a_1 = 3.76702$

Gráfico



3 Questão 3

3.1 Polinômios de Legendre

k	a_k	$EAk^{(g)}$	$ERk^{(g)}$
1	-0.0687344	-	-
2	0.532457	0.189007	0.25
3	-0.865385	0.299557	0.130435
4	-0.964732	0.265916	0.0852273
5	-0.463847	0.047812	0.062167
6	0.375012	0.0255699	0.048402
7	1.74117	0.466412	0.0393442
8	-0.111747	0.00166499	0.0329739
9	-0.0153137	2.75893e-05	0.0282721
10	0.061655	0.000400141	0.024672
11	-0.343787	0.0112561	0.0218348

Os gráficos se encontram na página seguinte.

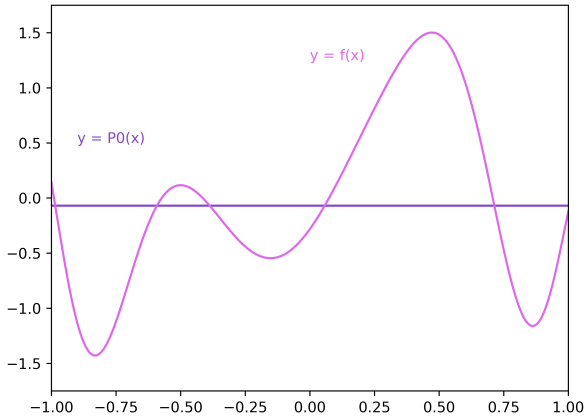


Figura 1: $P_0(x)$

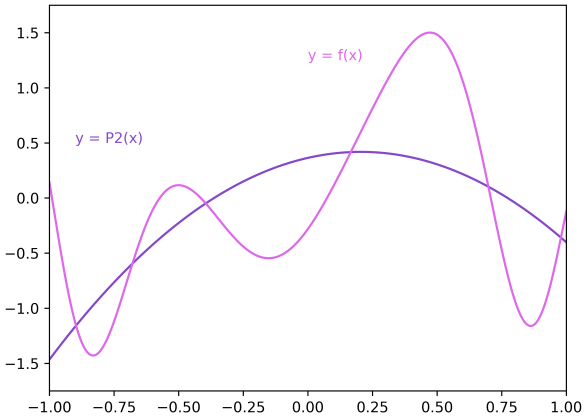


Figura 2: $P_2(x)$

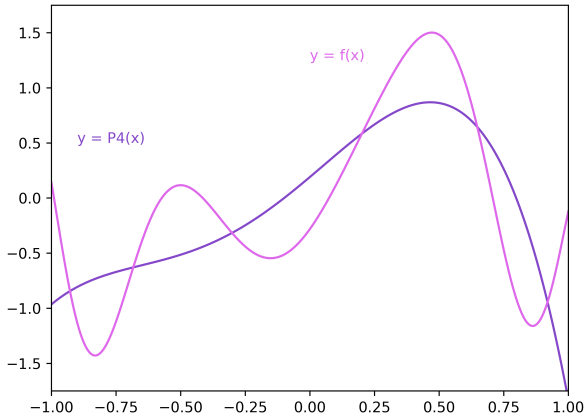


Figura 3: $P_4(x)$

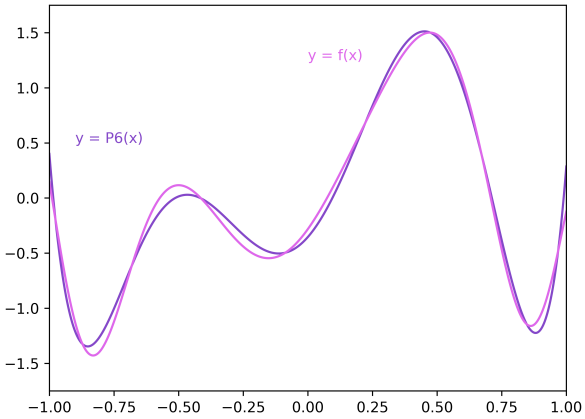


Figura 4: $P_6(x)$

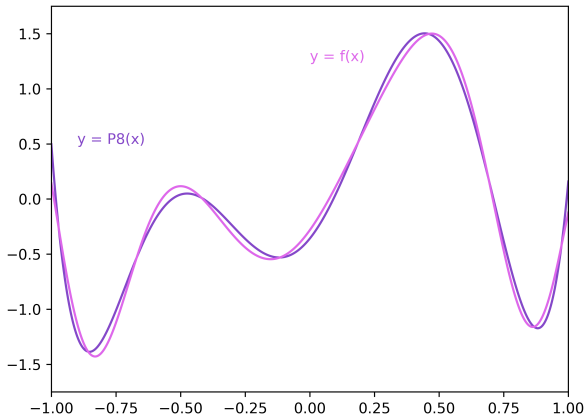


Figura 5: $P_8(x)$

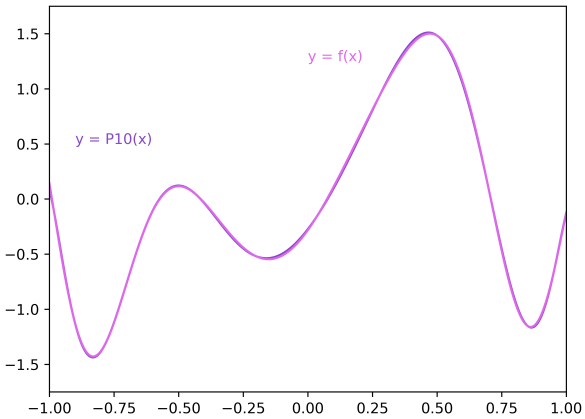


Figura 6: $P_{10}(x)$

3.2 Polinômios Trigonométricos

k	a_k	b_k	$EAk^{(g)}$	$ERk^{(g)}$
1	-0.137469	0	-	-
2	0.448341	0.673432	0.654521	0.992834
3	-0.677344	0.160073	0.484418	0.423567
4	-0.138937	-0.0200598	0.0197058	0.0169385
5	0.277551	0.0380214	0.0784802	0.0631962
6	-0.198467	-0.0180536	0.0397152	0.0309896
7	0.123138	0.0159351	0.0154168	0.0118867
8	-0.0798956	-0.0129728	0.0065516	0.00502603
9	0.0554315	0.0112046	0.00319819	0.00244748
10	-0.0408021	-0.00982591	0.00176136	0.0013461
11	0.0314089	0.0087665	0.00106337	0.000812008

Os gráficos se encontram na página seguinte.

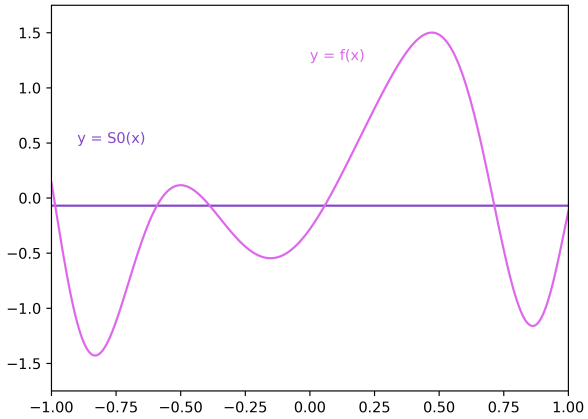


Figura 7: $S_0(x)$

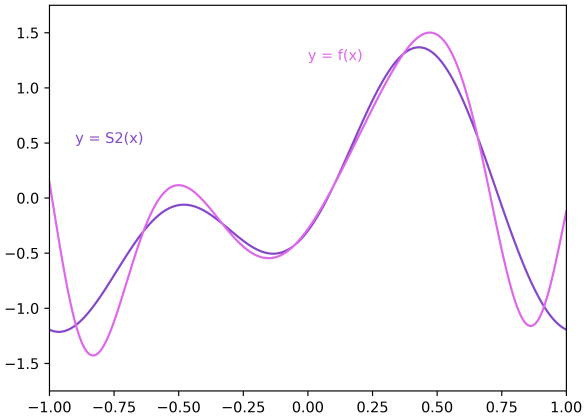


Figura 8: $S_2(x)$

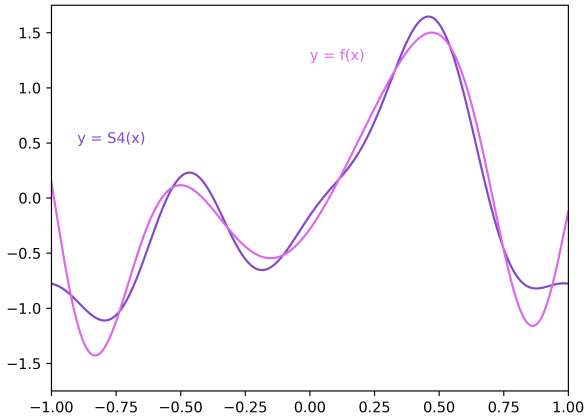


Figura 9: $S_4(x)$

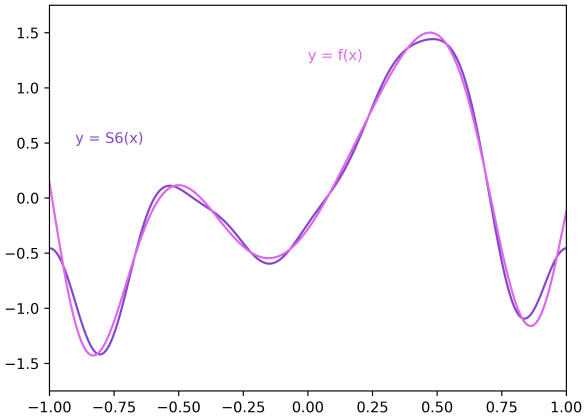


Figura 10: $S_6(x)$

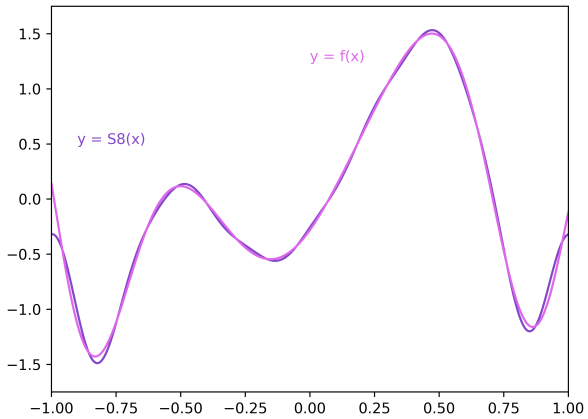


Figura 11: $S_8(x)$

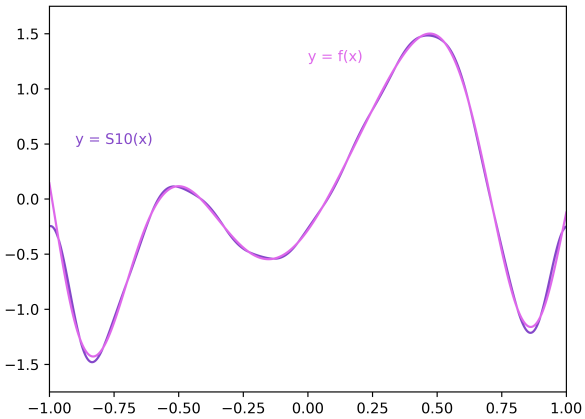


Figura 12: $S_{10}(x)$