

Model Selection

สมาชิกกลุ่ม

นายกฤตพล ผ้าเจริญ 6401012620161

นายเจษฎา ศรีจุลโพธิ์ 6401012620170

นายศุภกร พลศิริ 6401012620234

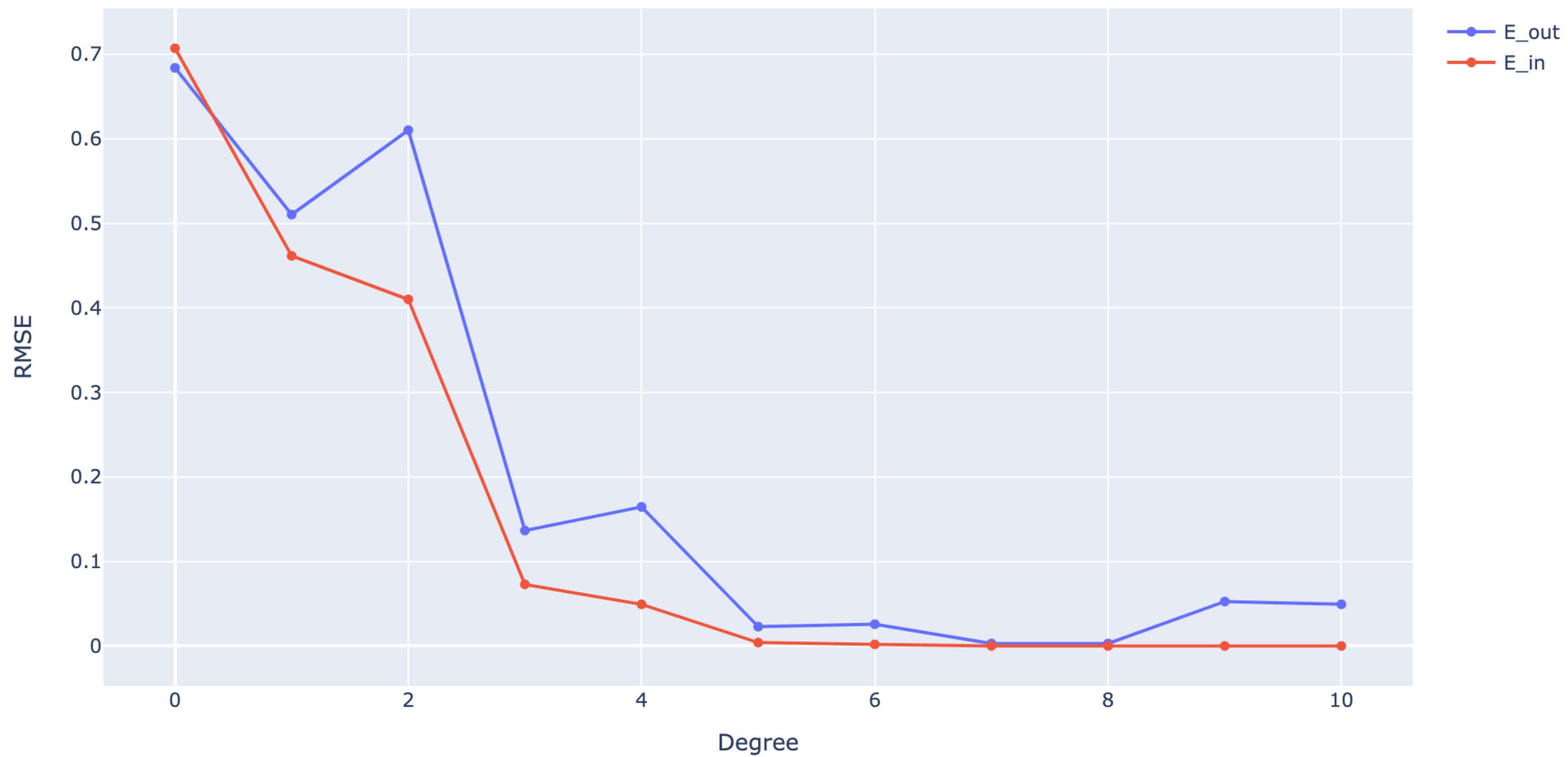
นายสิรภพ ห่วงวิไล 6401012630132

**1. ทดลองซ้ำและการปรับพารามิเตอร์ให้
มากกว่าใน lecture หรือลอง
generate data ที่แตกต่างจากที่เรียน**

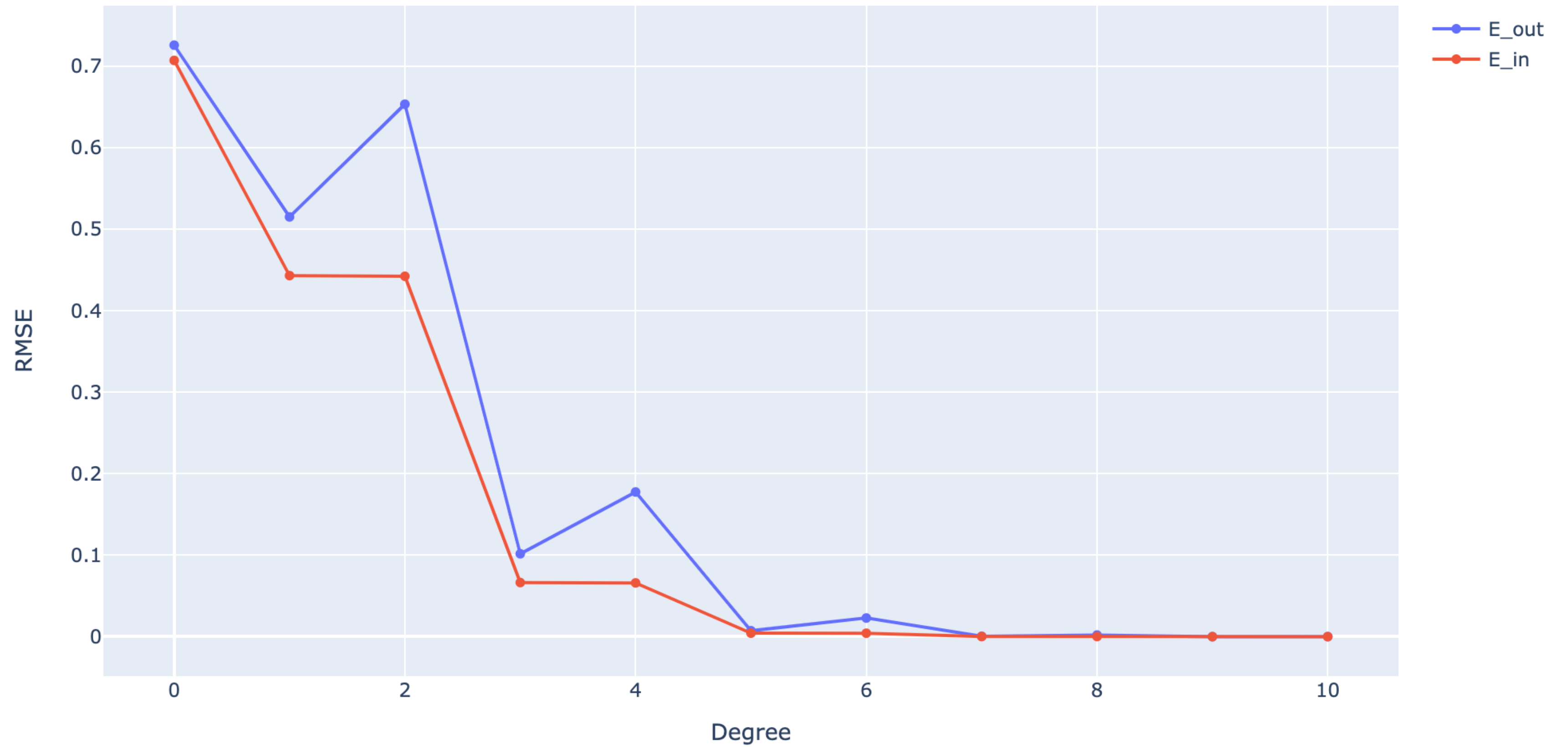
Noiseless

Noiseless	Degree = 1		Degree = 3		Degree = 8		Degree = 10	
Sample Size	Training	CV	Training	CV	Training	CV	Training	CV
10	0.4615	0.5104	0.0729	0.1366	0	0.0029	0	0.0493
20	0.4475	0.5126	0.0686	0.1051	0.0001	0.0021	0	0.0001
40	0.444	0.5145	0.0669	0.1023	0.0001	0.002	0	0.0001
80	0.4431	0.5151	0.0664	0.1017	0.0002	0.002	0	0.0001

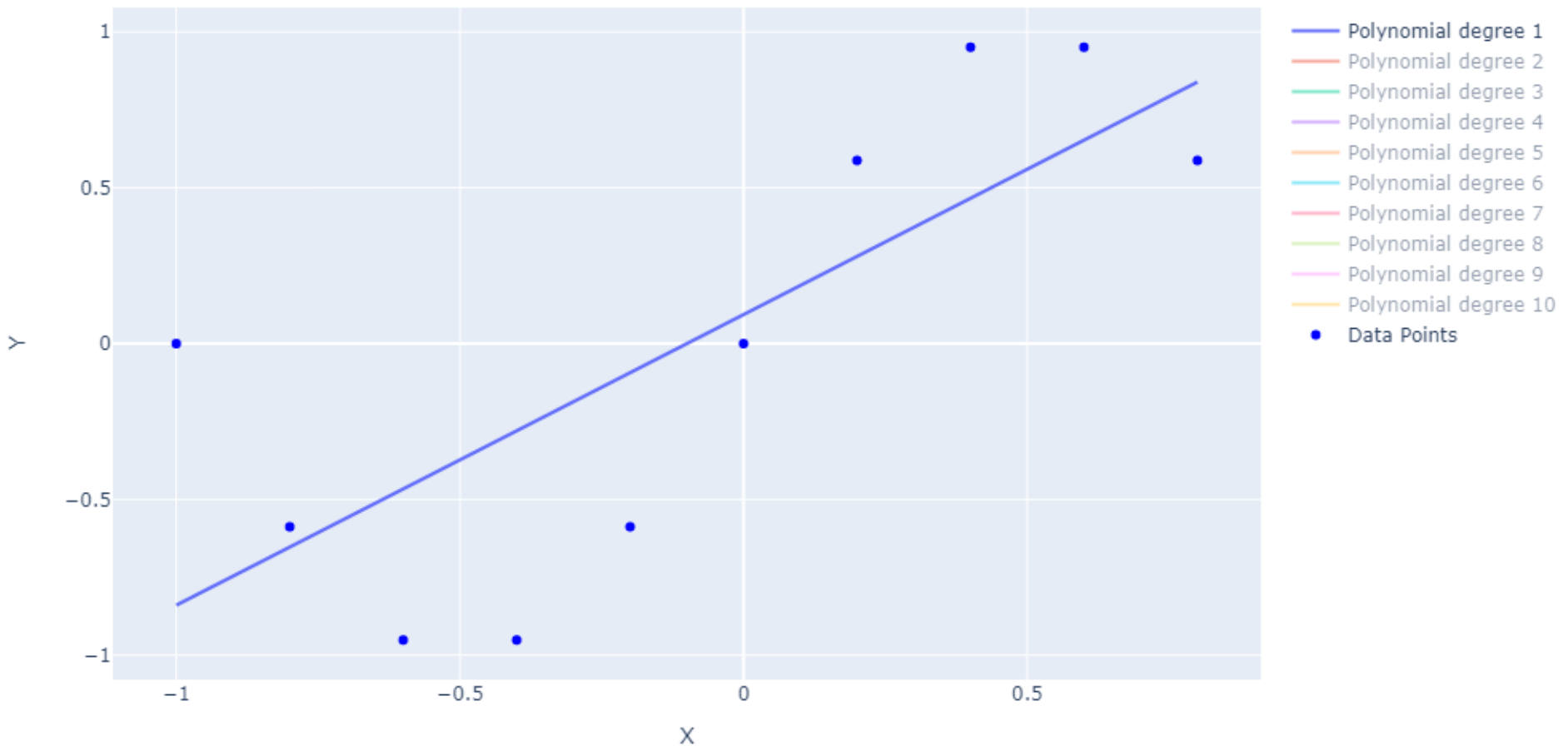
sin_noiseless_10sample



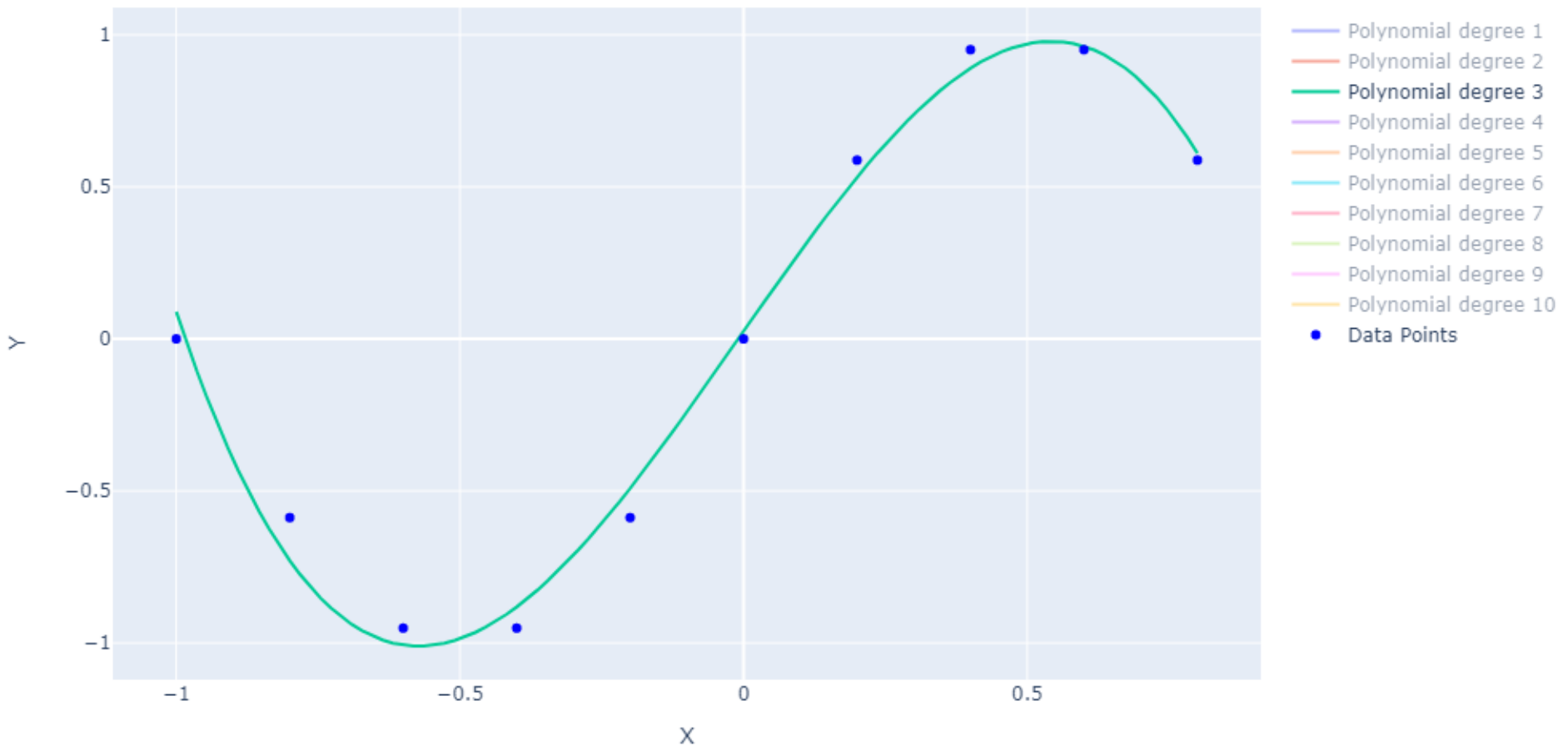
sin_noiseless_80sample



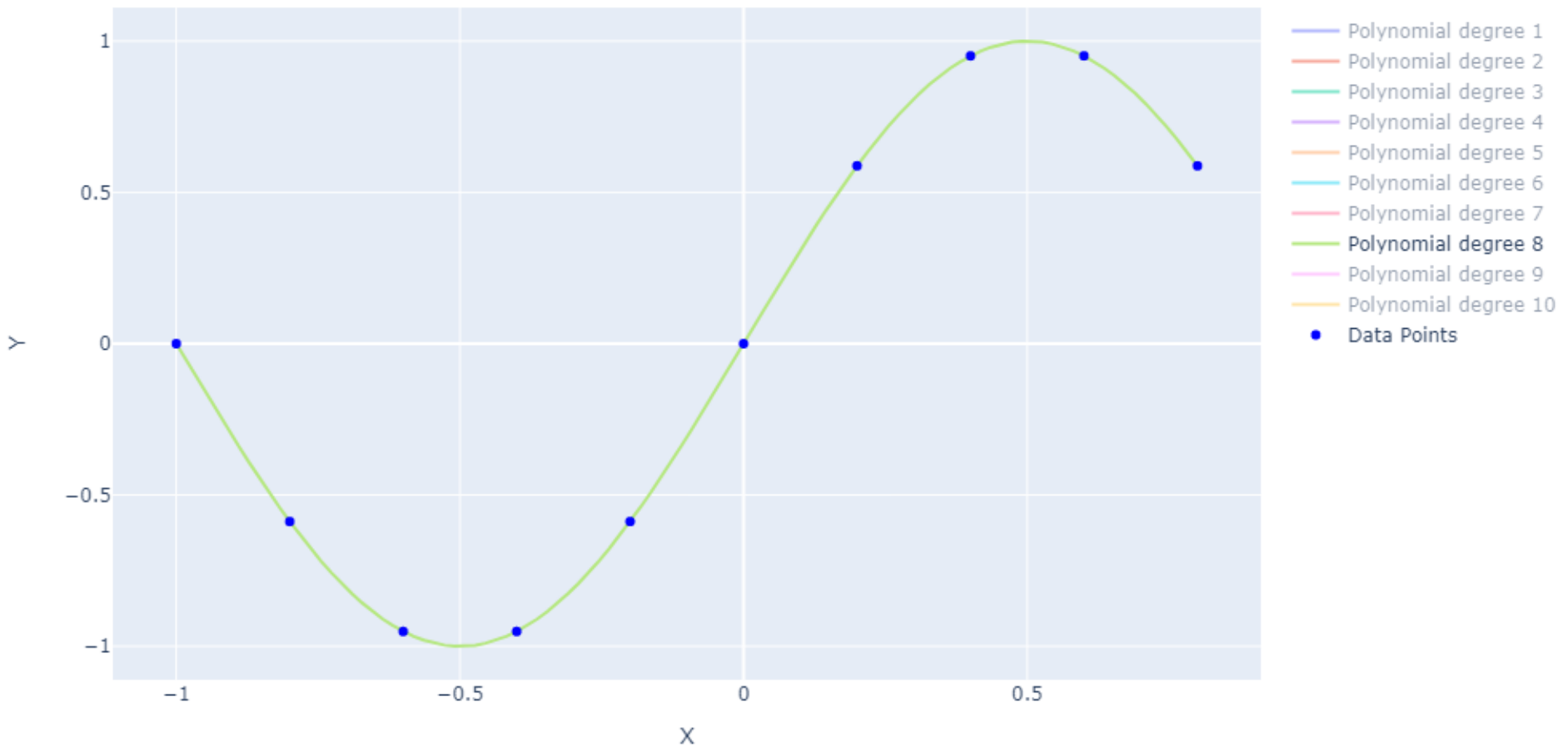
Data and Polynomial Regression 10 Samples



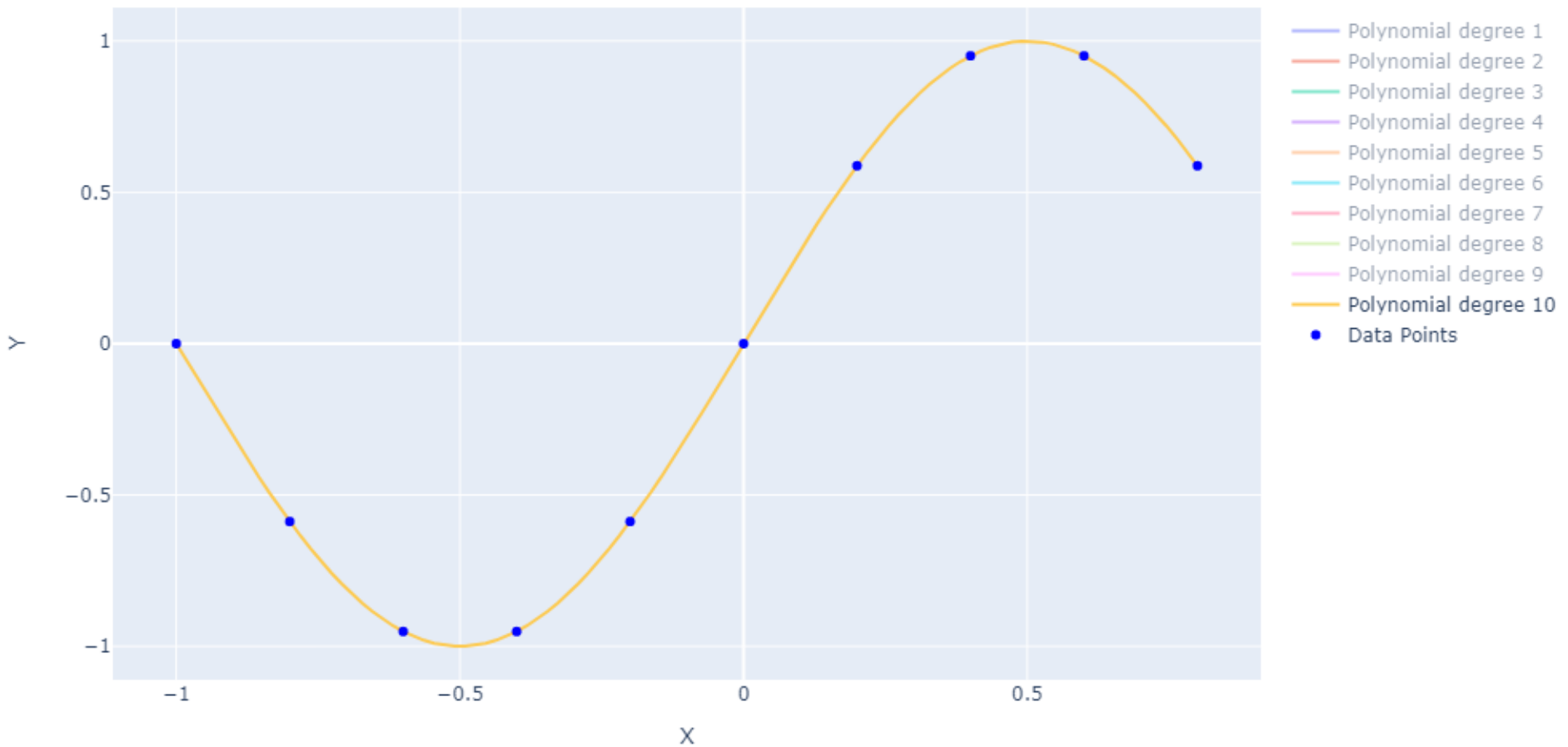
Data and Polynomial Regression 10 Samples



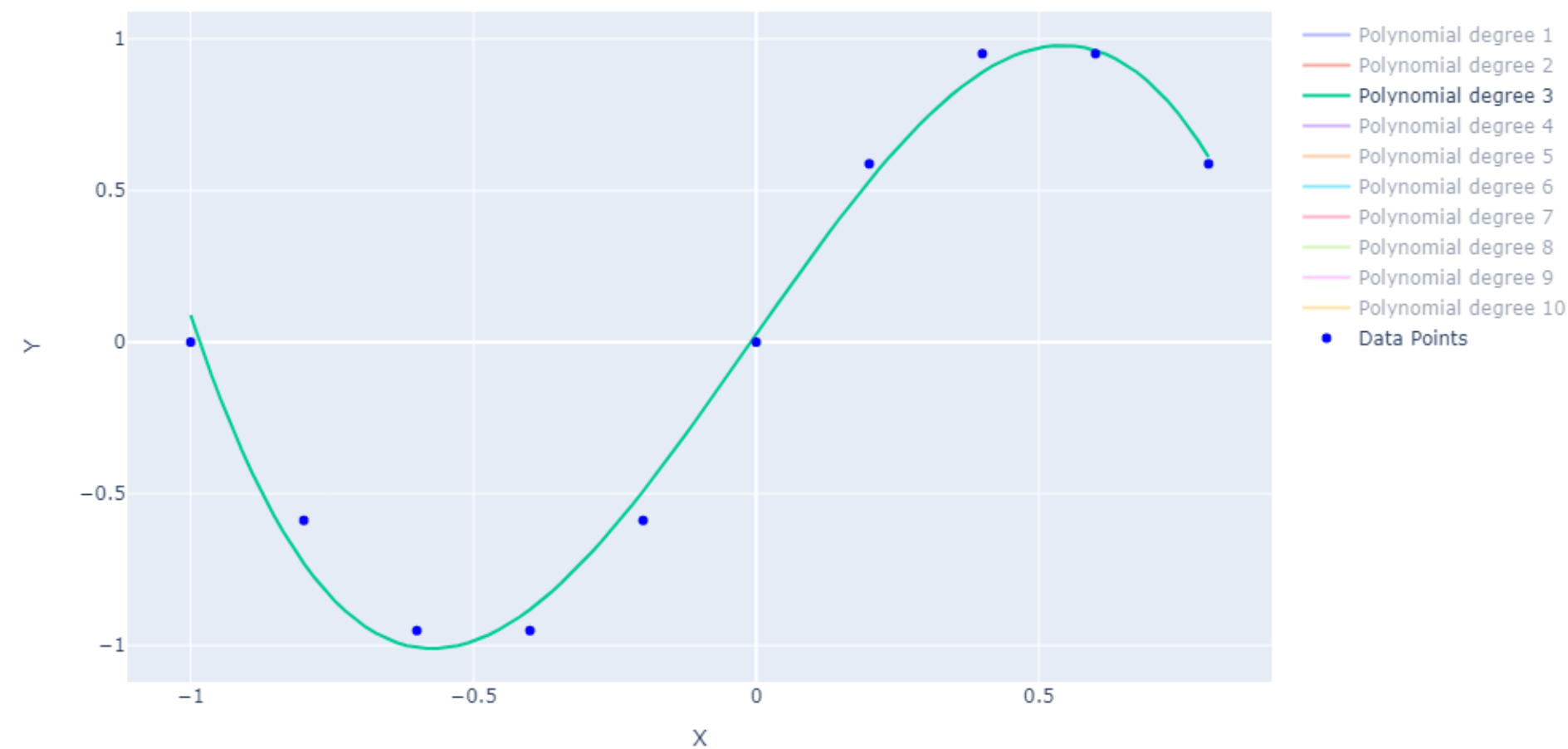
Data and Polynomial Regression 10 Samples



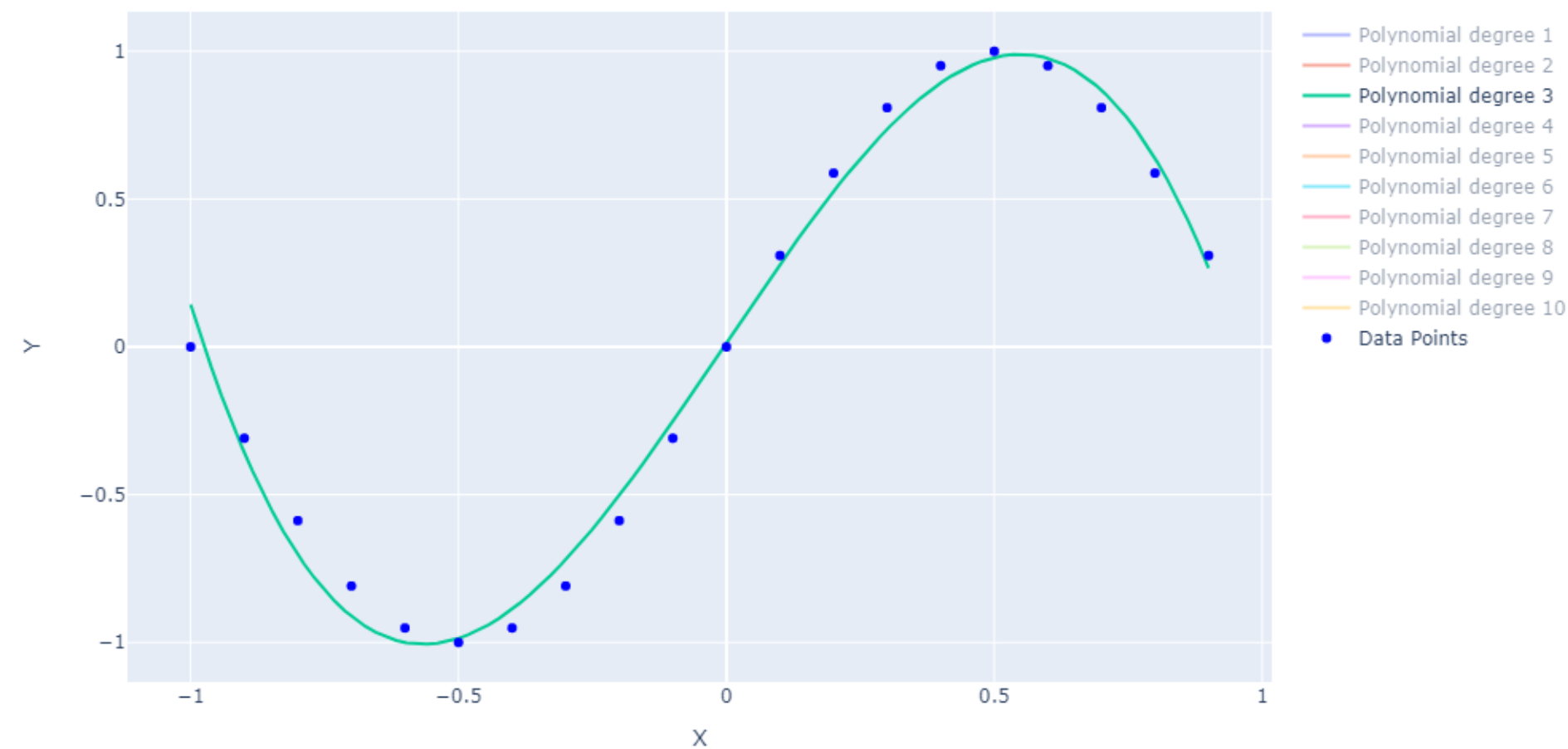
Data and Polynomial Regression 10 Samples



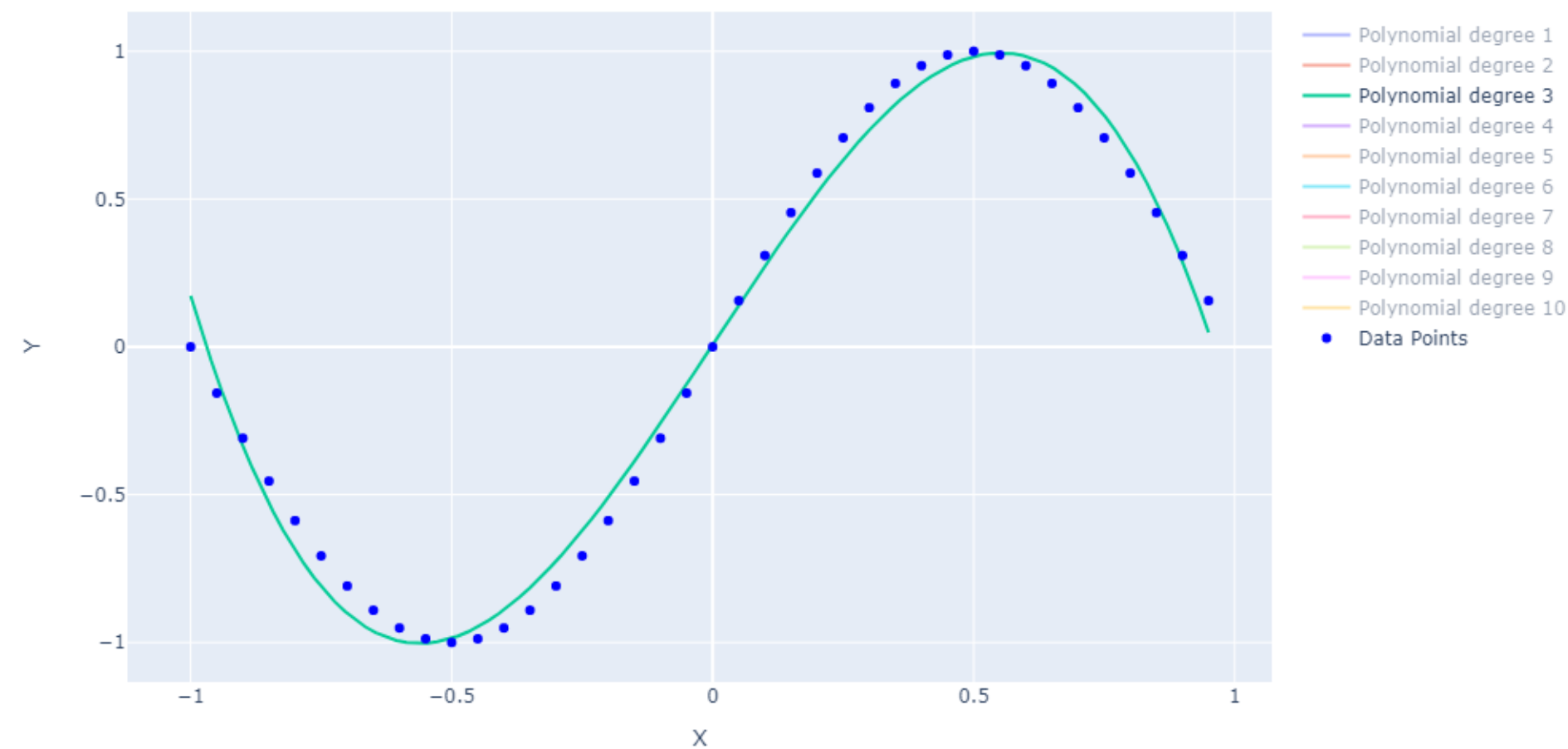
Data and Polynomial Regression 10 Samples



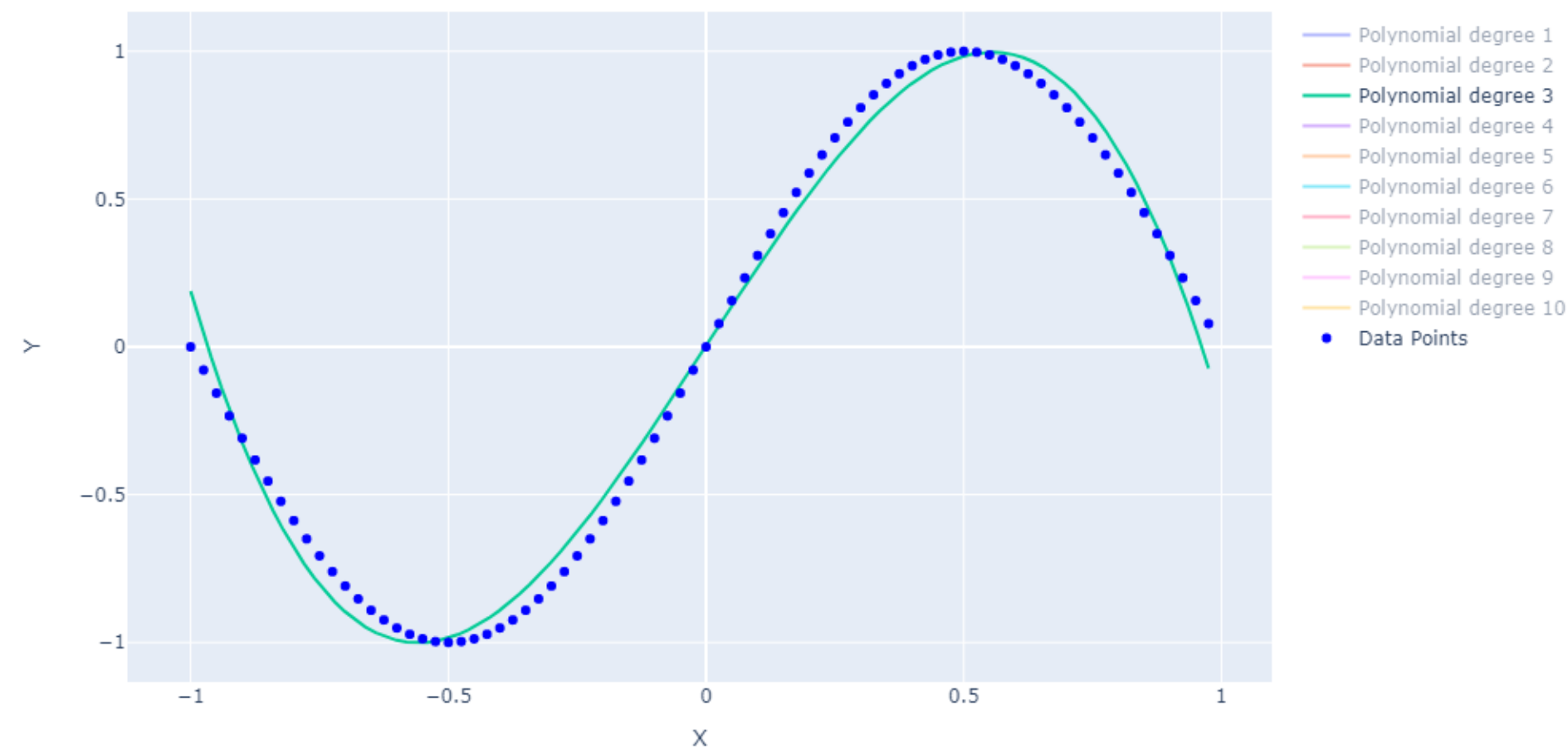
Data and Polynomial Regression 20 Samples



Data and Polynomial Regression 40 Samples

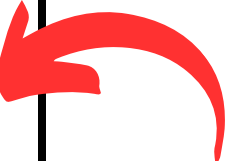
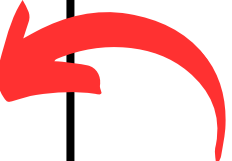


Data and Polynomial Regression 80 Samples

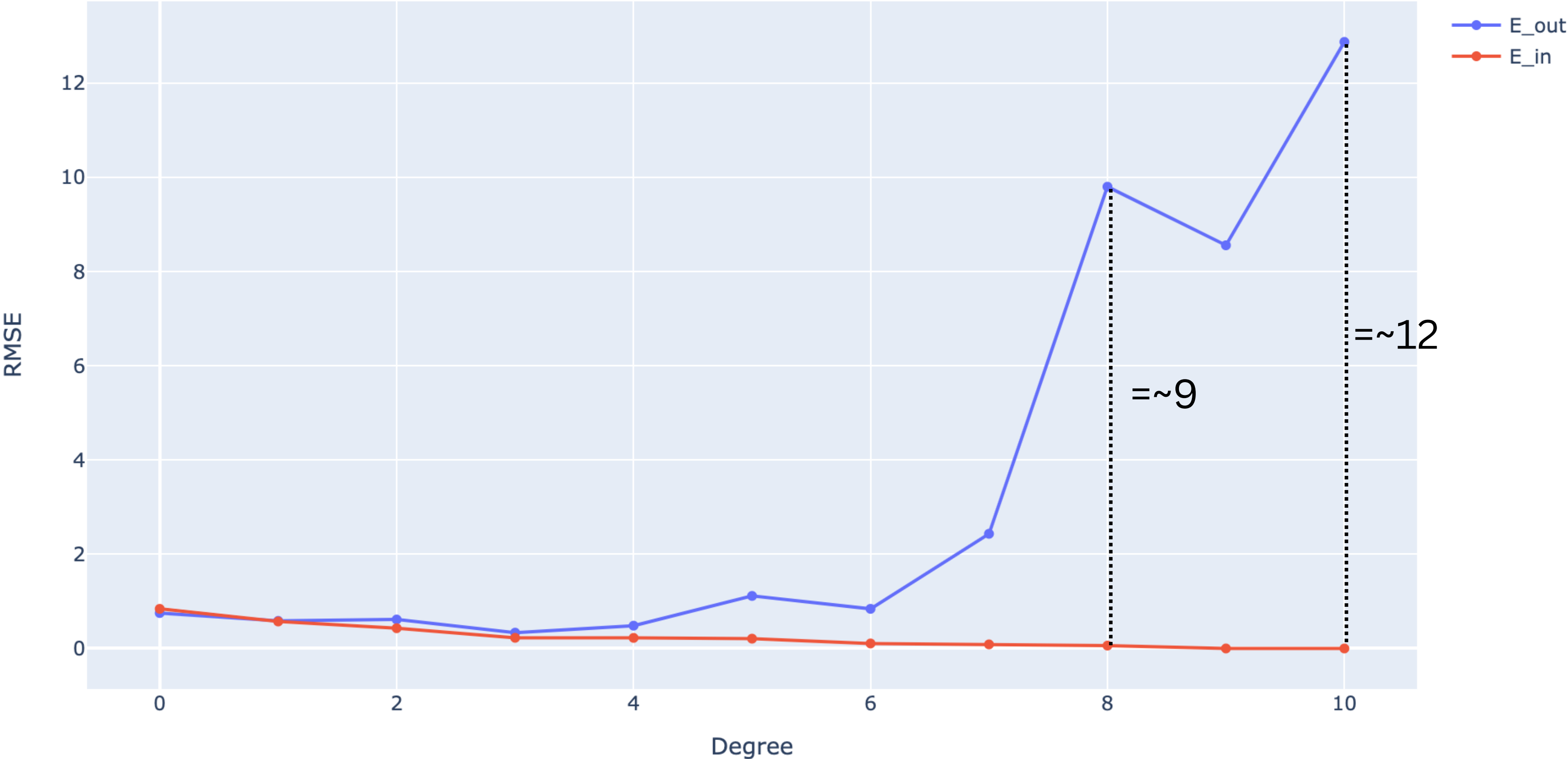


Noisy

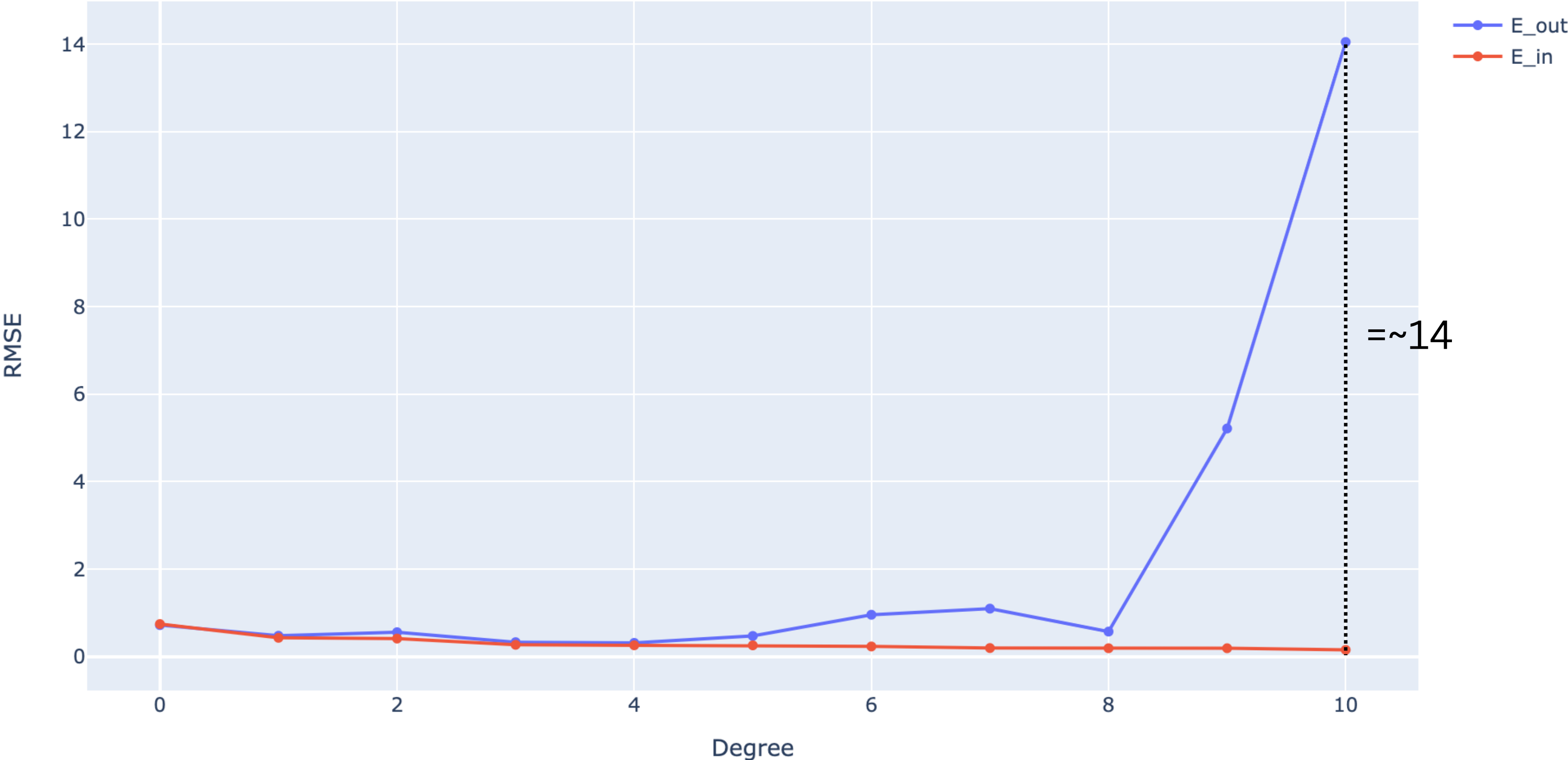
Noisy	Degree = 1		Degree = 3		Degree = 8		Degree = 10	
Sample Size	Training	CV	Training	CV	Training	CV	Training	CV
10	0.5728	0.5861	0.2265	0.3355	0.0607	9.8027	0	12.8773
20	0.4316	0.4783	0.272	0.3315	0.1936	0.5742	0.1563	14.0502
40	0.5445	0.5745	0.2929	0.2827	0.2718	0.8057	0.2707	4.0169
80	0.499	0.5706	0.2737	0.2987	0.2578	0.4009	0.2531	0.7520



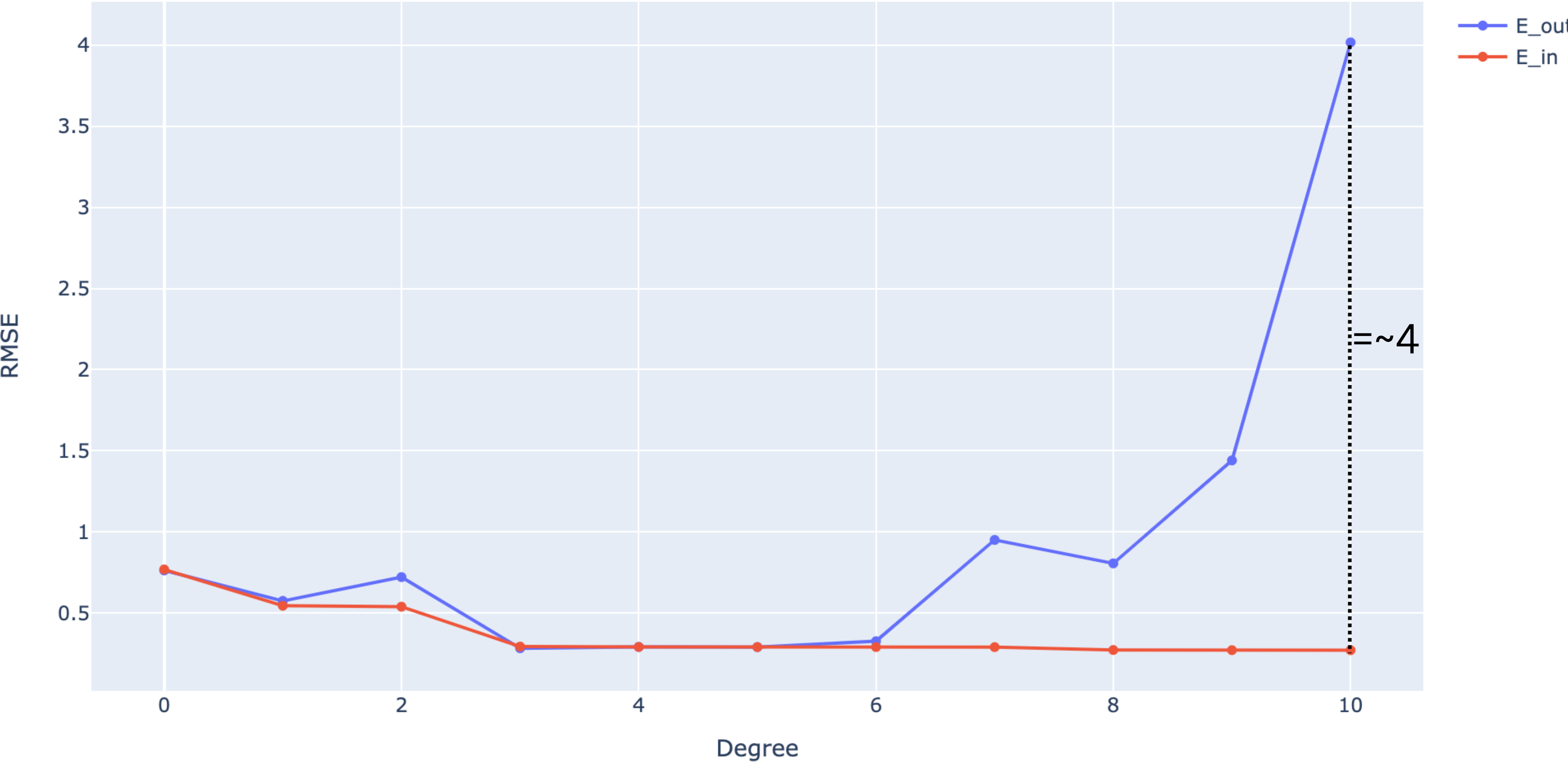
sin_noisy_10sample



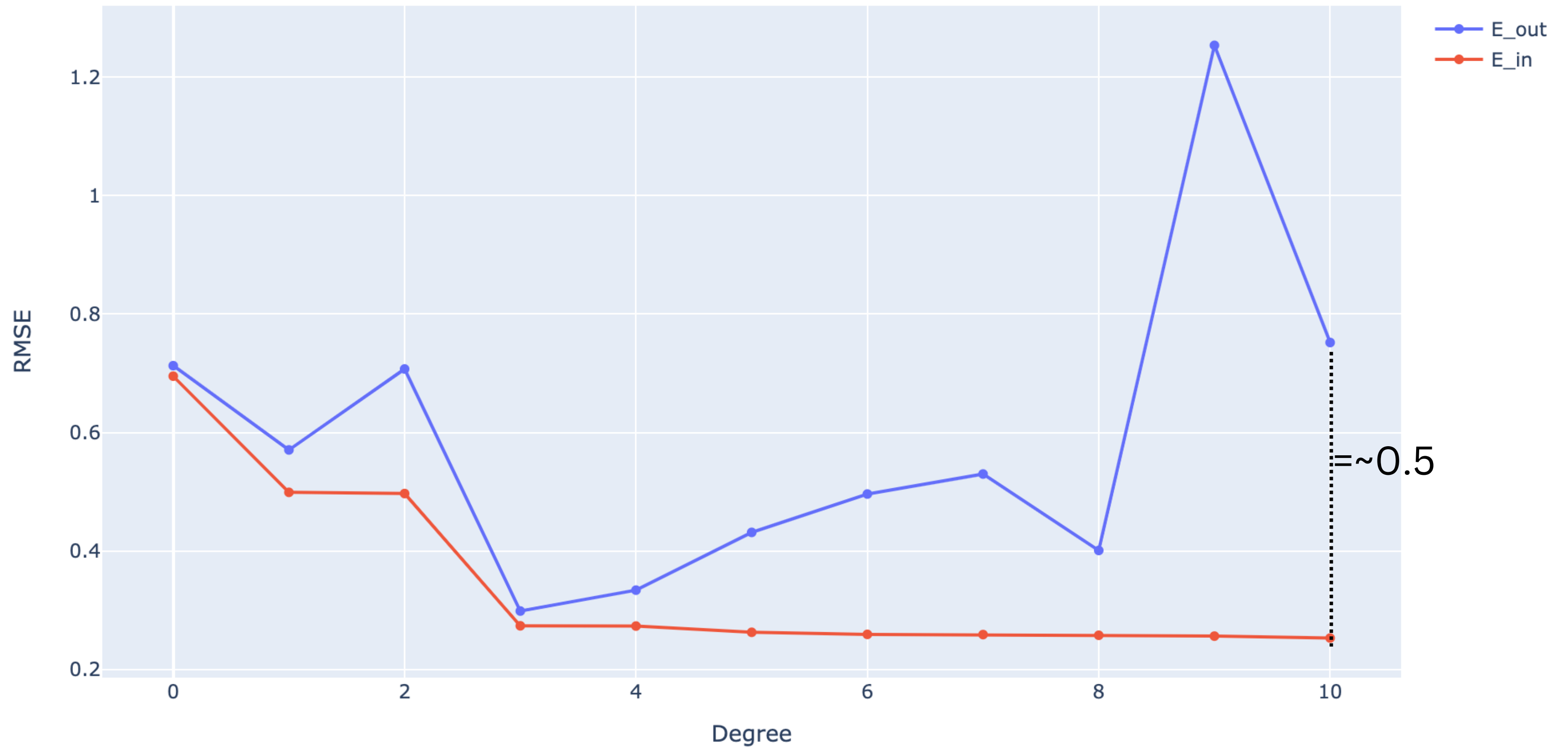
sin_noisy_20sample



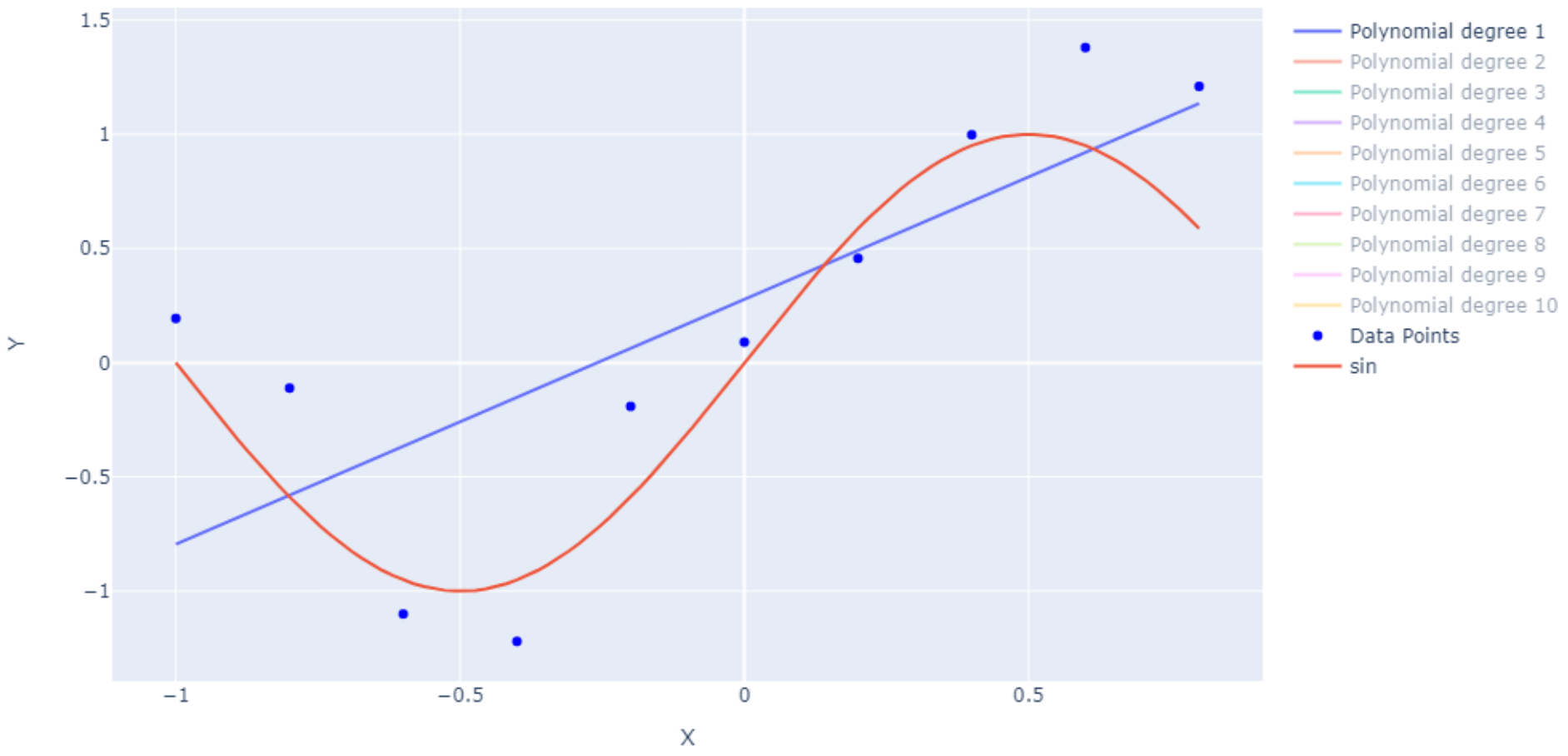
sin_noisy_40sample



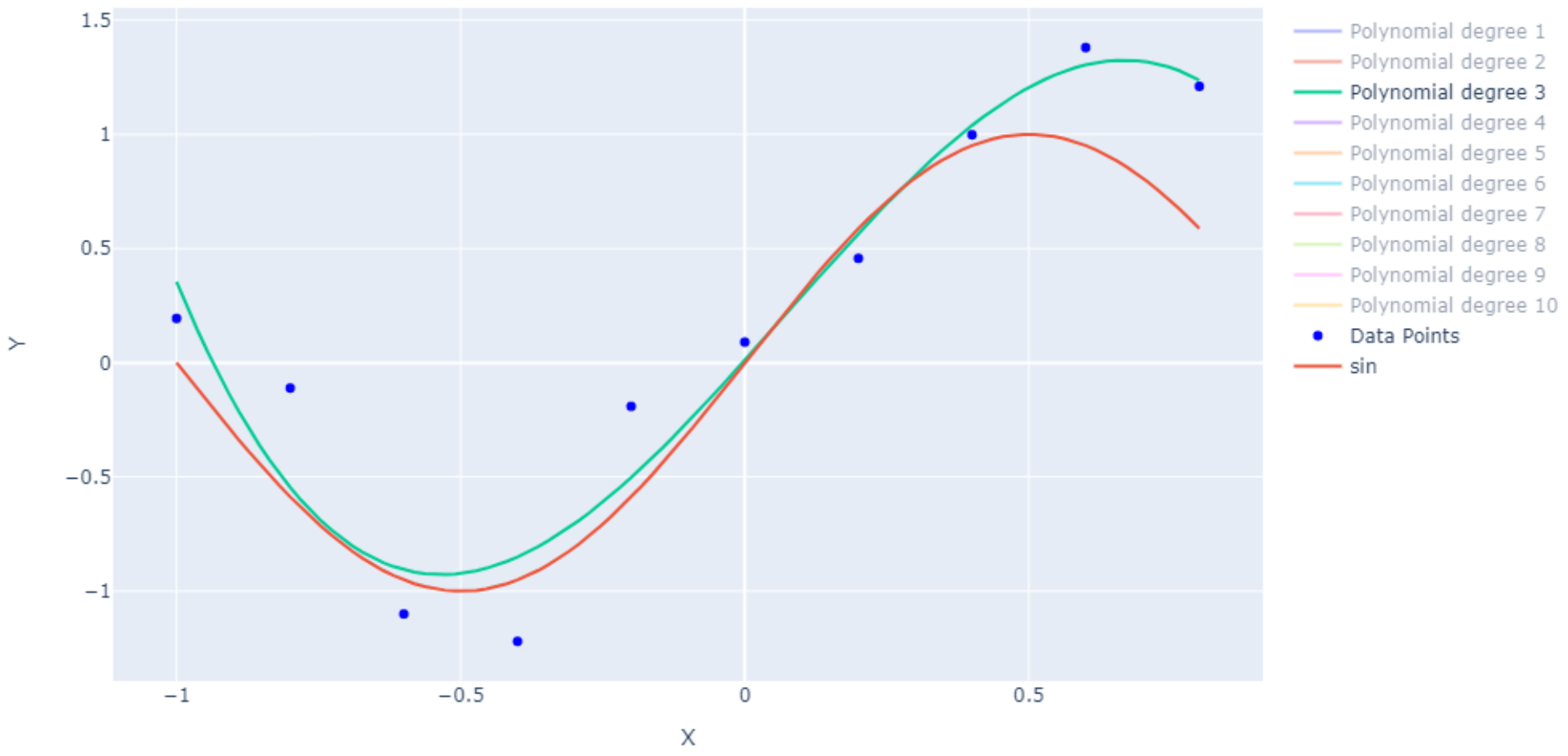
sin_noisy_80sample



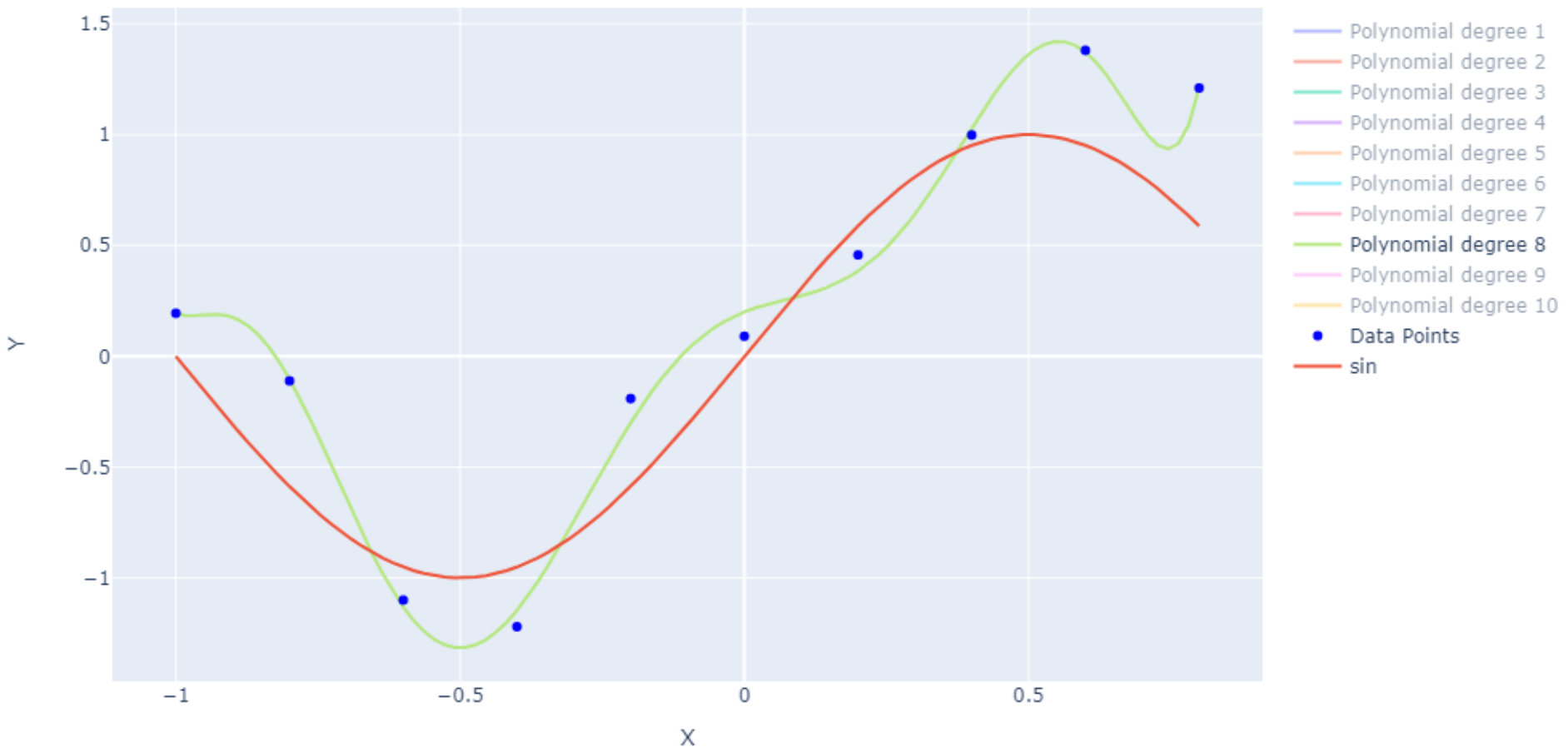
Data and Polynomial Regression 10 Samples



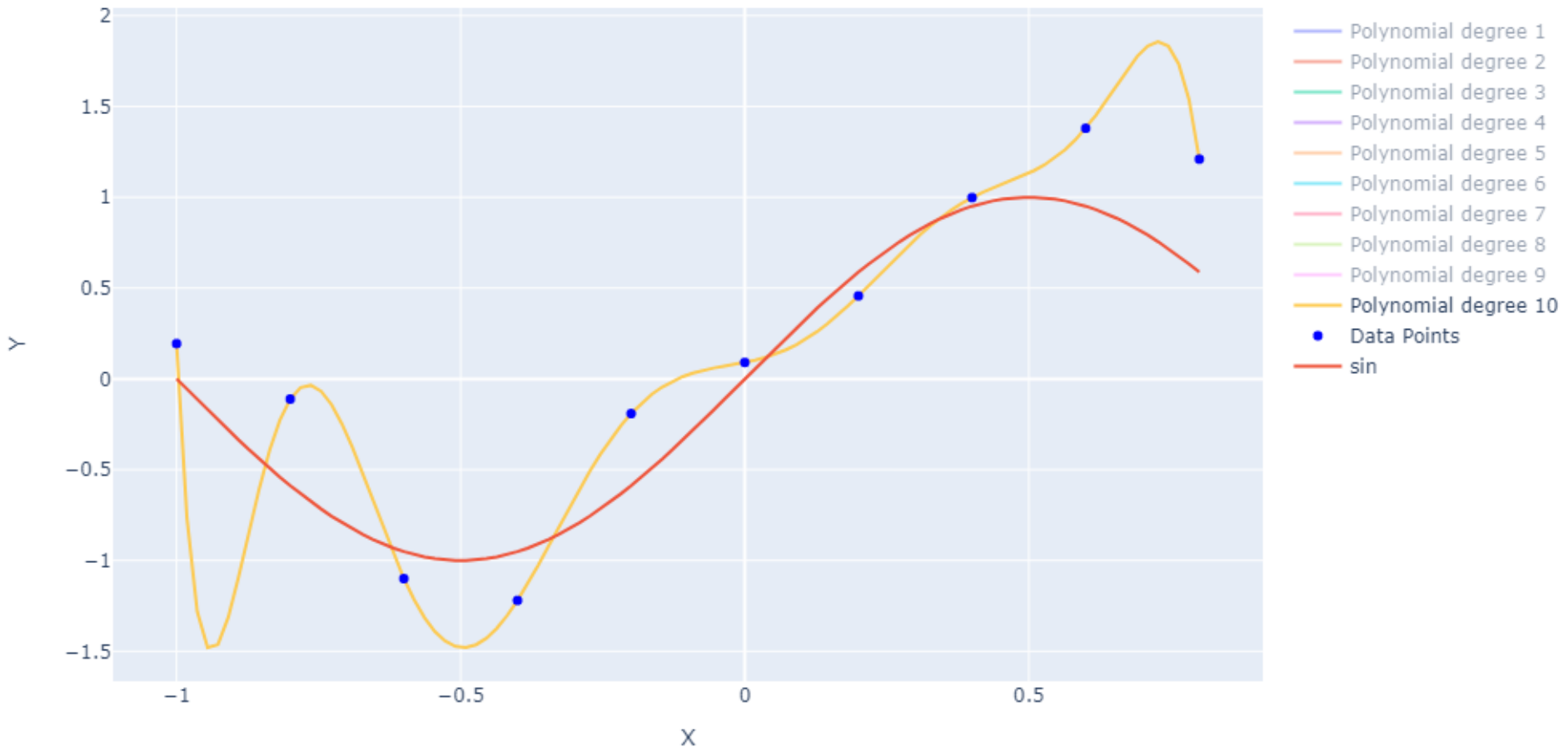
Data and Polynomial Regression 10 Samples



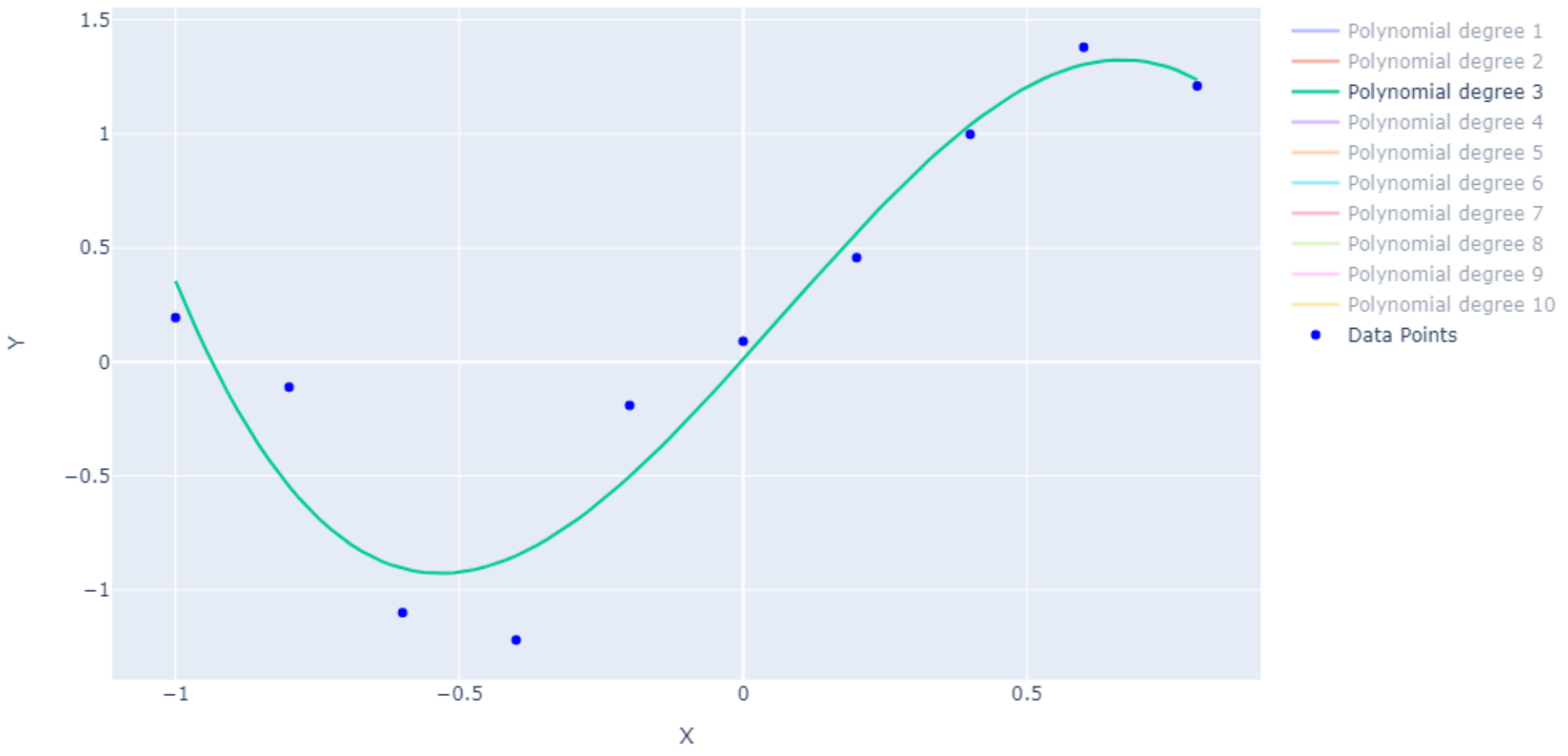
Data and Polynomial Regression 10 Samples



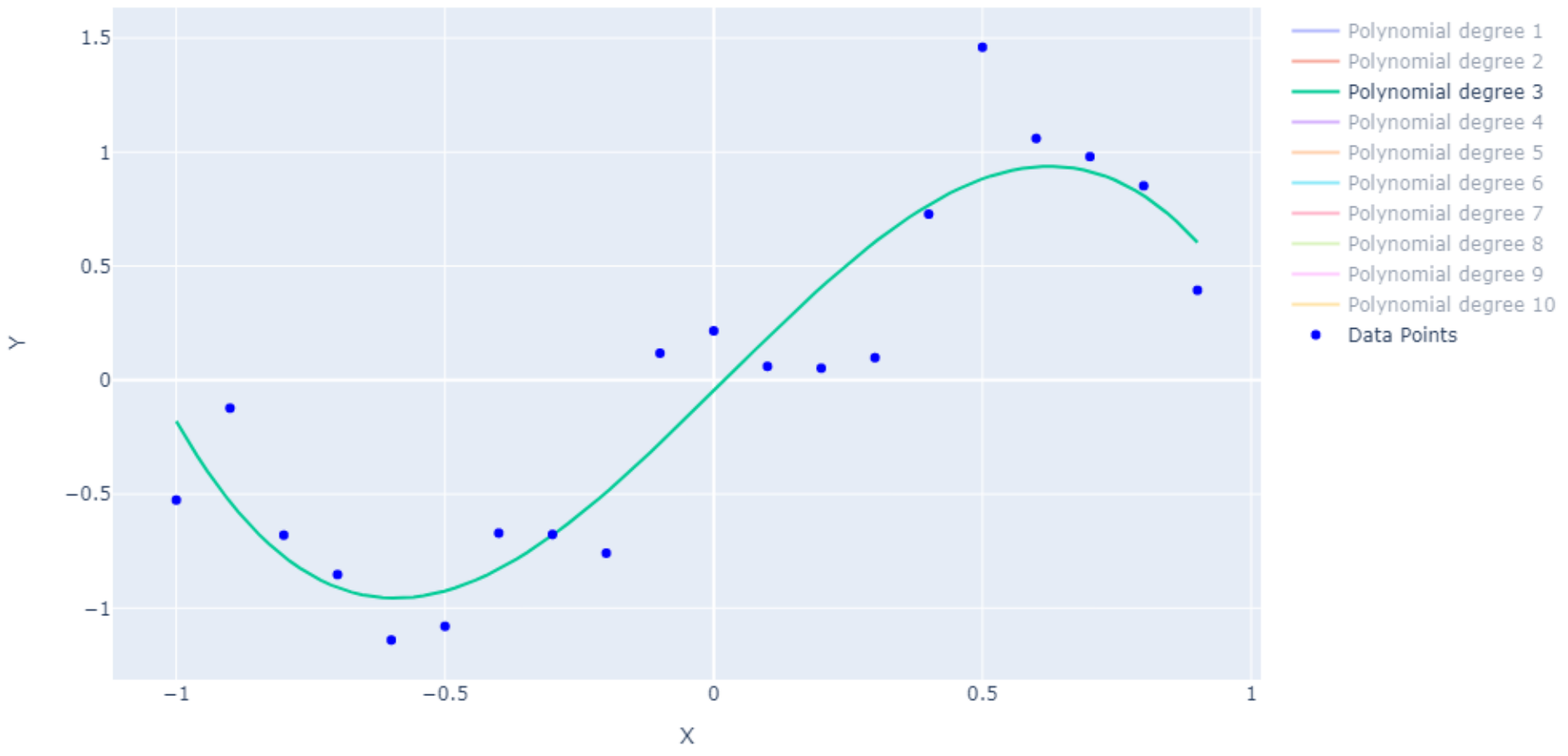
Data and Polynomial Regression 10 Samples



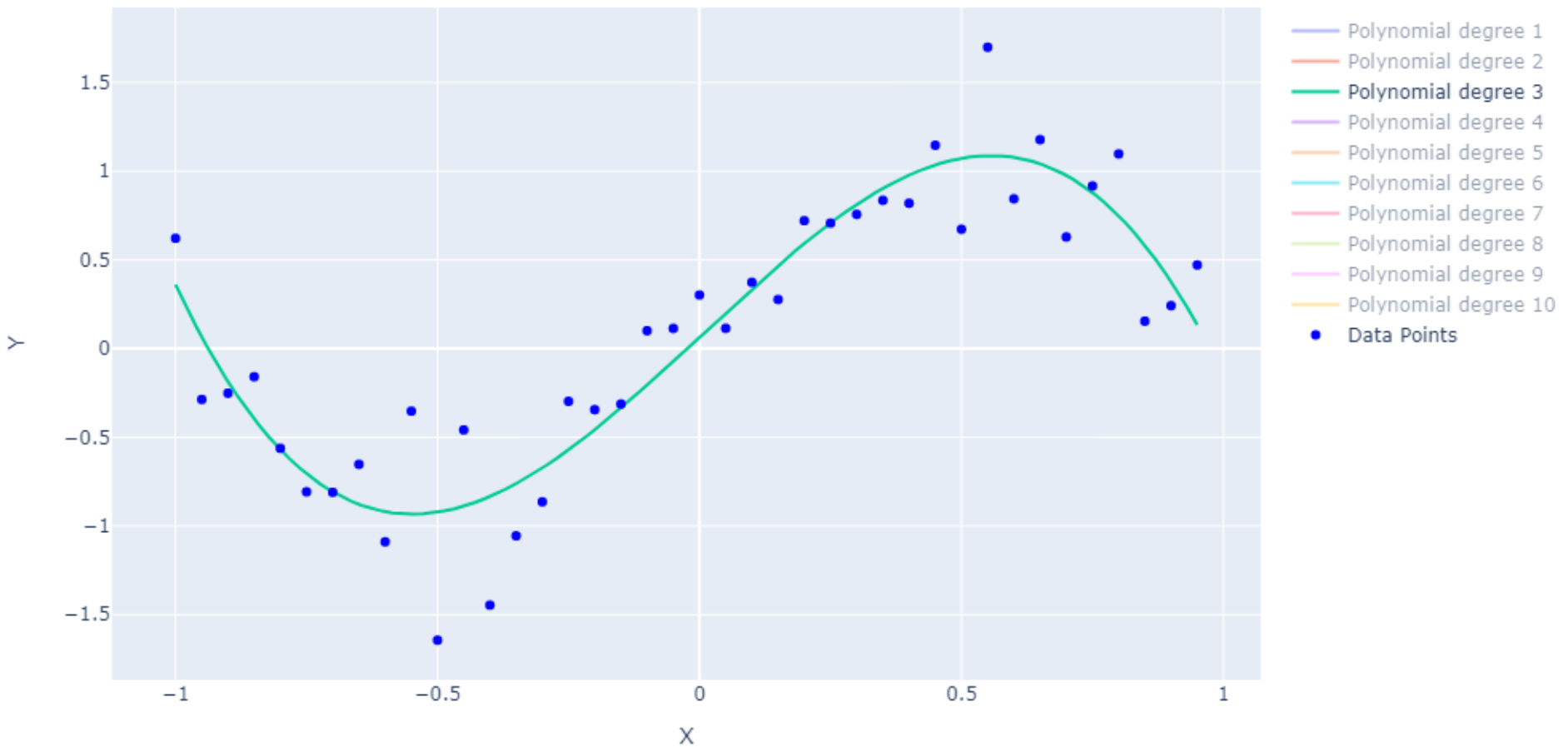
Data and Polynomial Regression 10 Samples



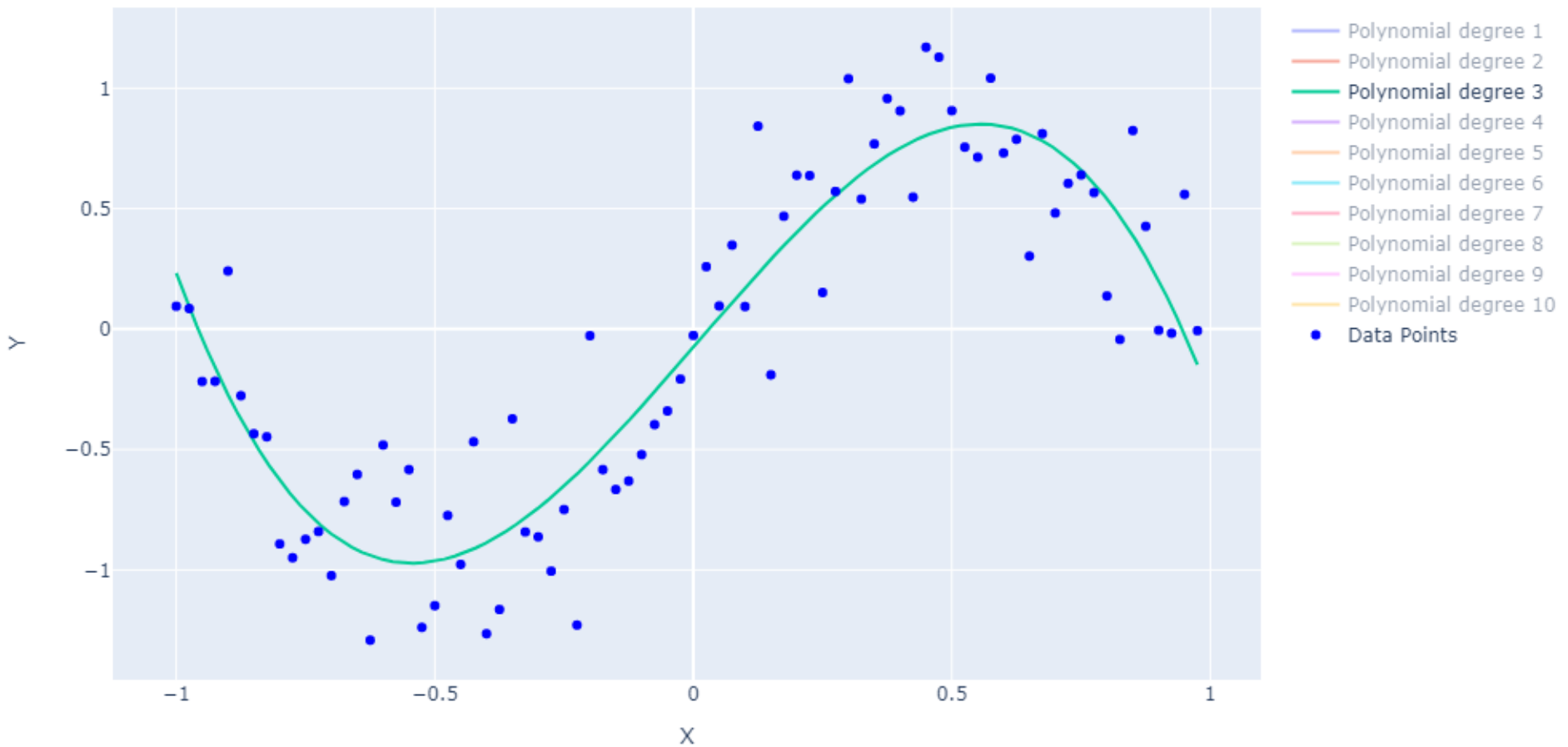
Data and Polynomial Regression 20 Samples



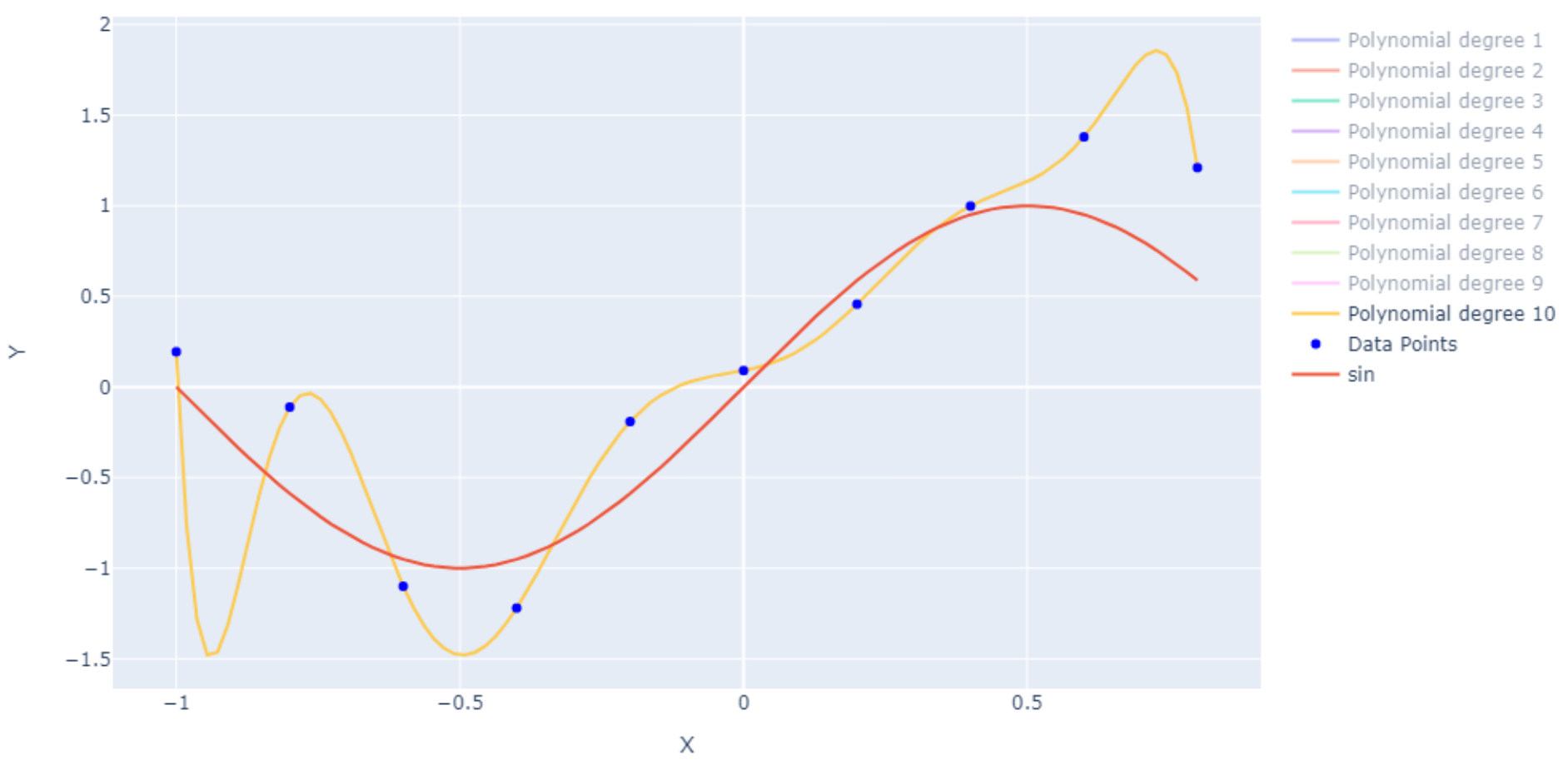
Data and Polynomial Regression 40 Samples



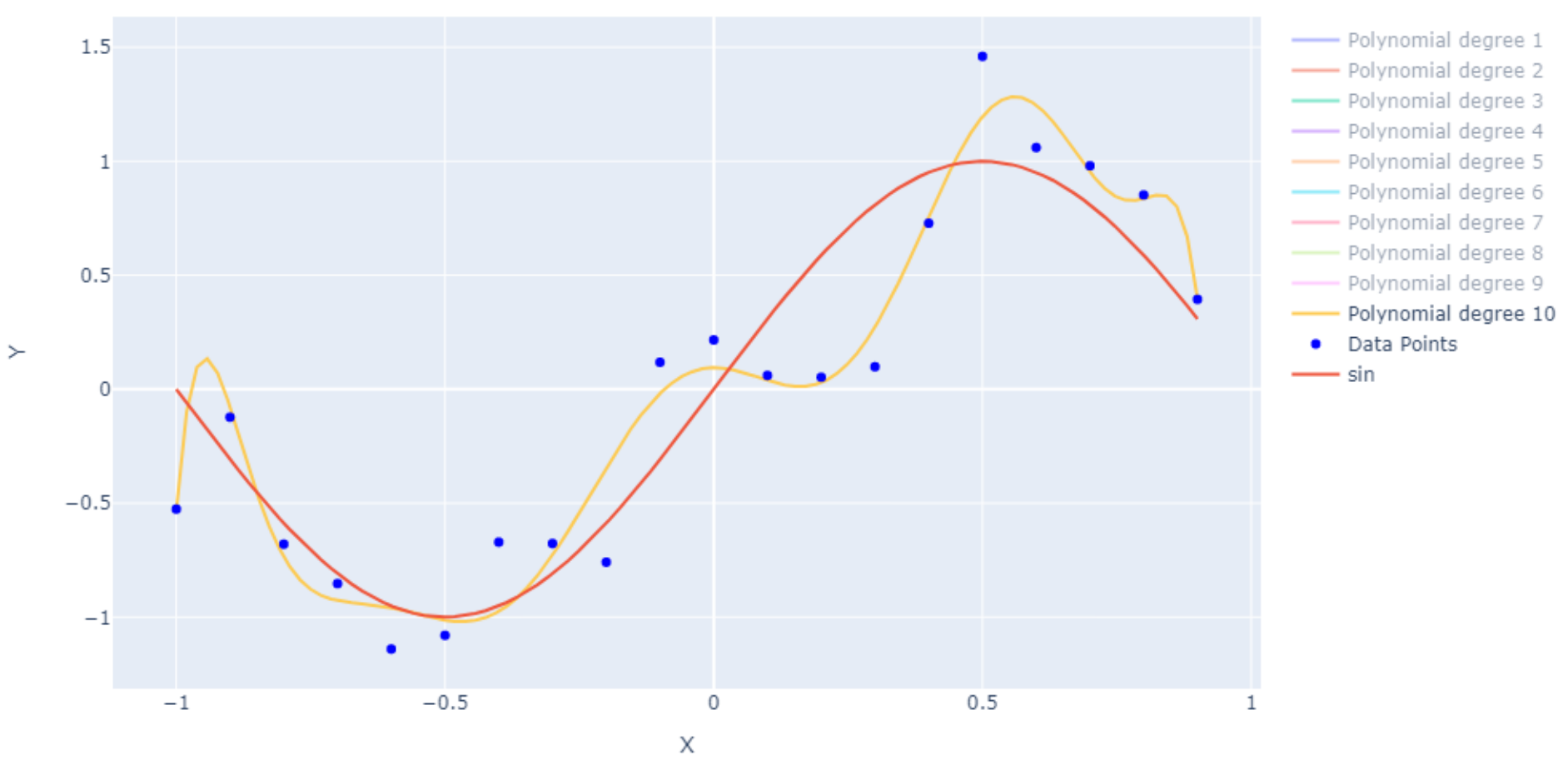
Data and Polynomial Regression 80 Samples



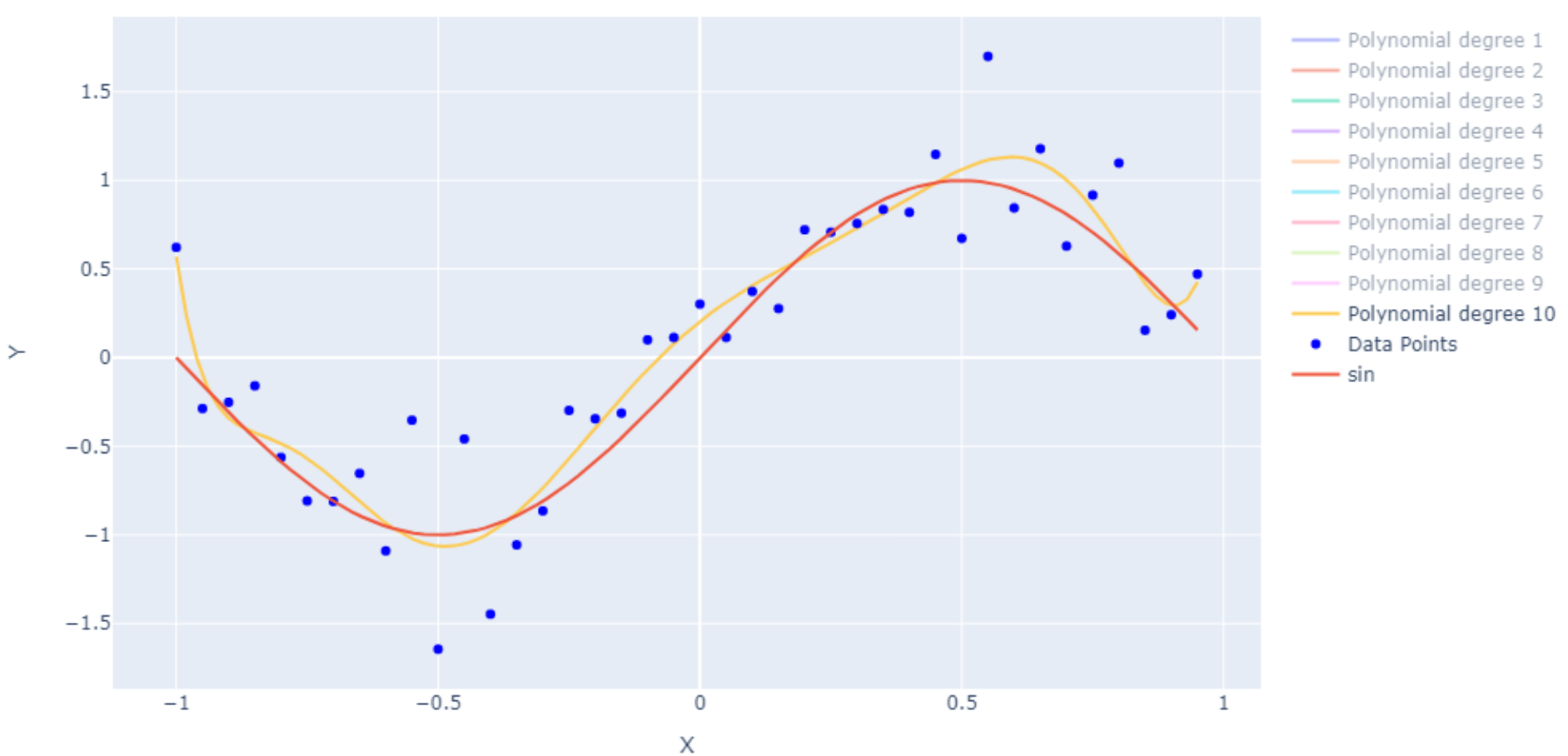
Data and Polynomial Regression 10 Samples



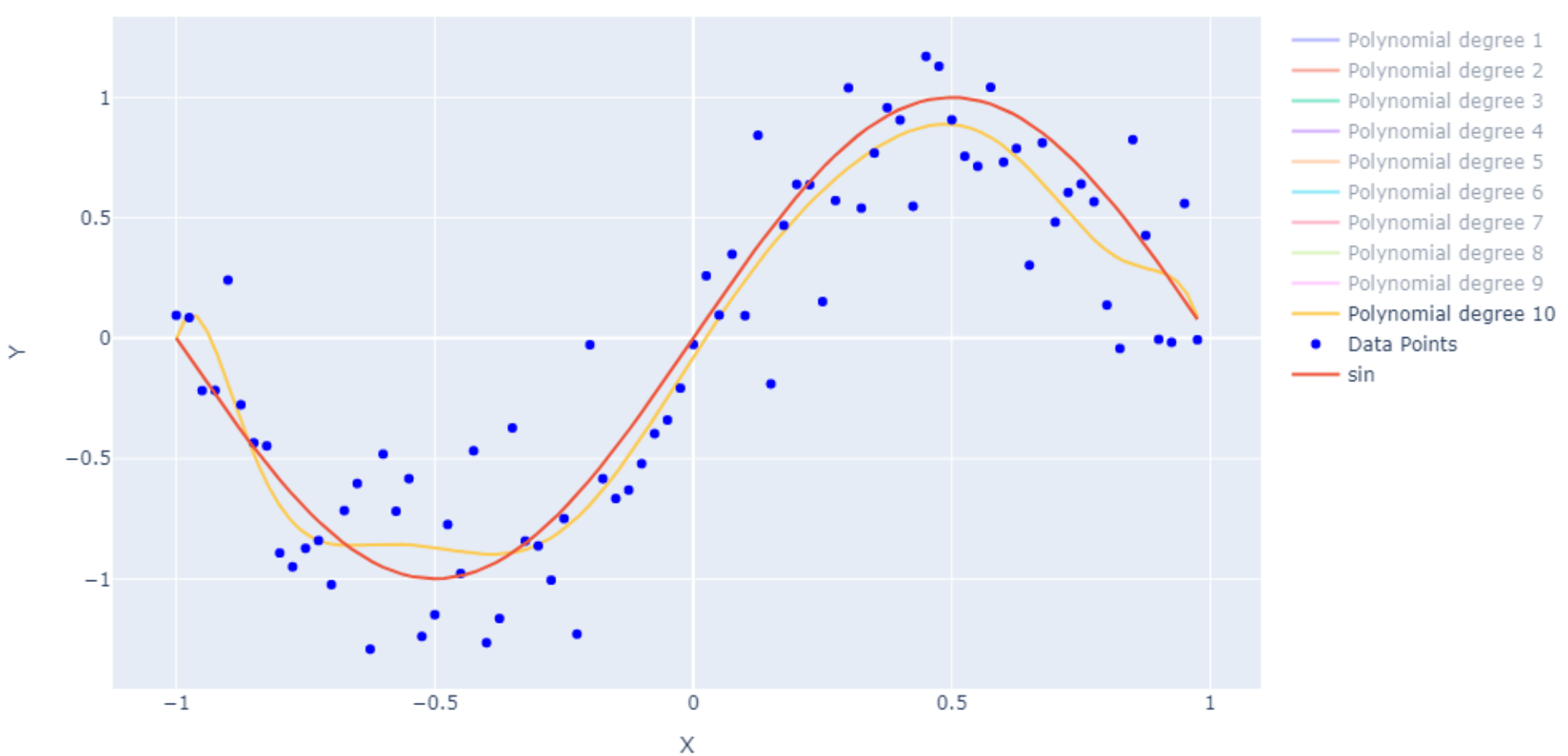
Data and Polynomial Regression 20 Samples



Data and Polynomial Regression 40 Samples



Data and Polynomial Regression 80 Samples

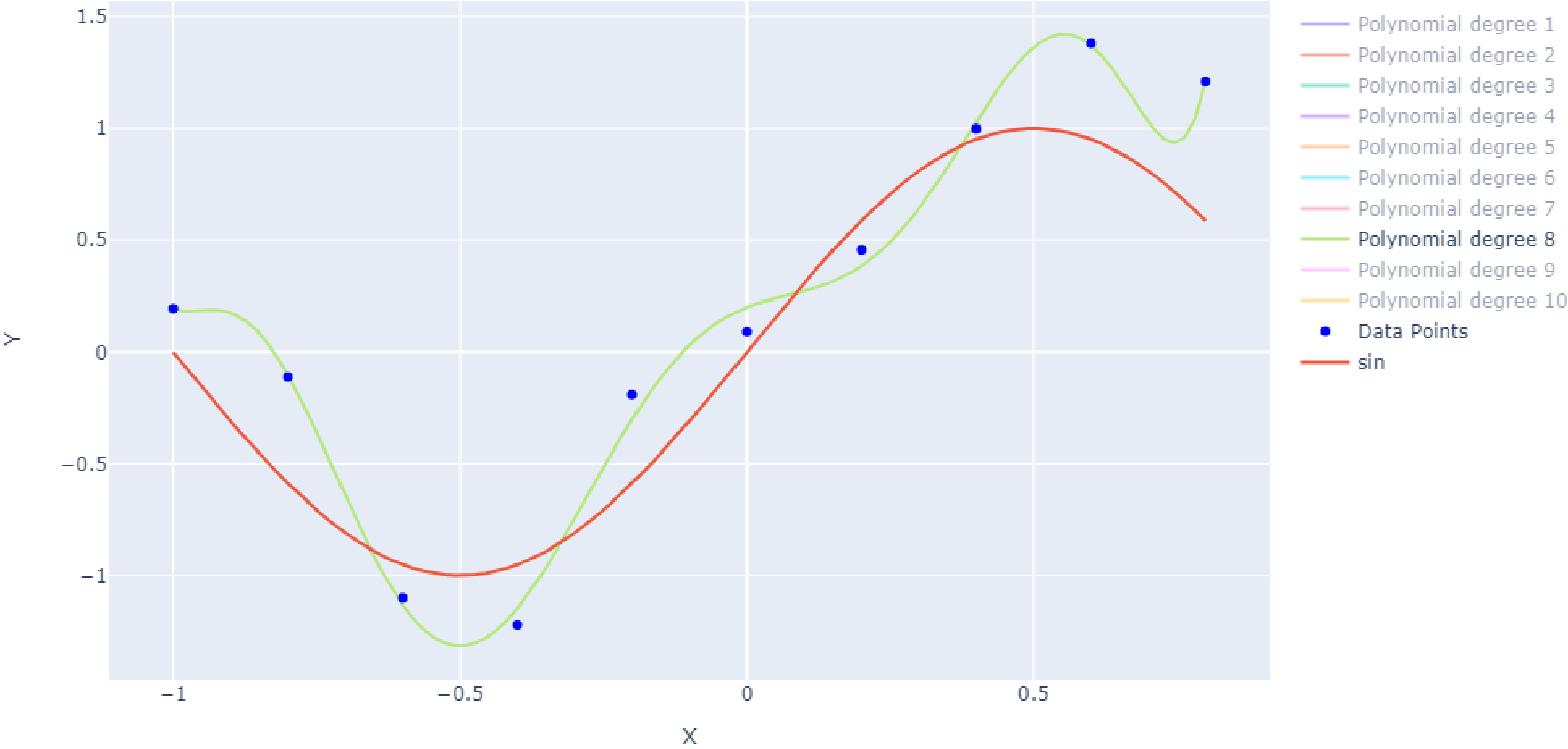


Coefficients

degree of polynomial = 8

อันดับ	Noiseless N = 10	Noisy N = 10	Noiseless N = 80	Noisy N = 80
w0	0	0.1999	0	-0.1266
w1	3.1414	1.0153	3.1399	3.1207
w2	0.0023	-5.1034	0.0009	1.758
w3	-5.163	20.0053	-5.1425	-6.4256
w4	-0.0234	31.2838	-0.0058	-8.0255
w5	2.5146	-67.3317	2.4489	5.2356
w6	0.0699	-67.4224	0.0117	11.603
w7	-0.5049	55.6246	-0.4471	-1.9941
w8	-0.0606	50.5487	-0.0071	-5.1145

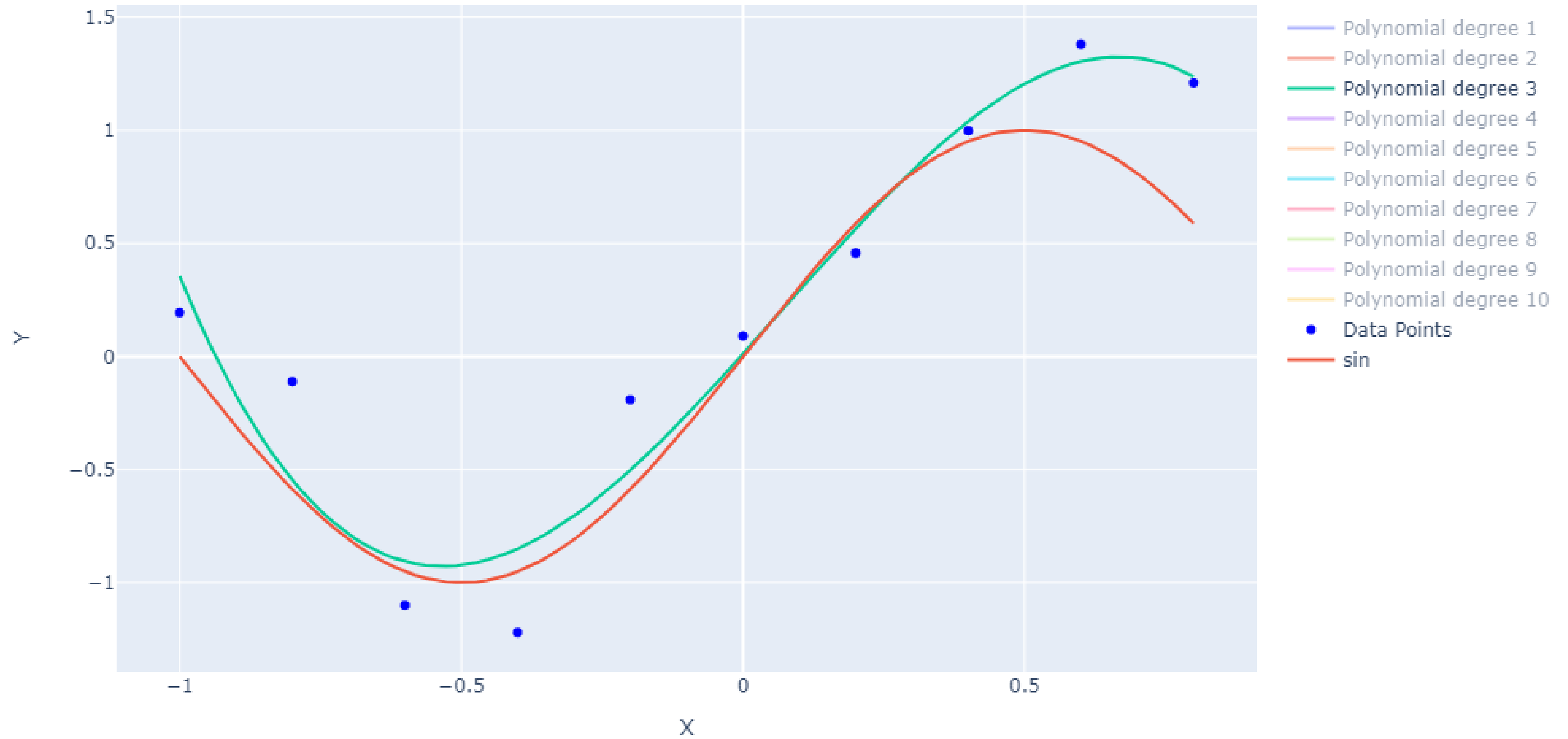
Data and Polynomial Regression 10 Samples



degree of polynomial = 3

อันดับ	Noiseless N = 10	Noisy N = 10	Noiseless N = 80	Noisy N = 80
w0	0.0254	0.0108	0.0038	-0.0752
w1	2.6739	2.7772	2.6920	2.4884
w2	-0.1323	0.5232	-0.0190	0.0491
w3	-2.8698	-2.5980	-2.8952	-2.7469

Data and Polynomial Regression 10 Samples

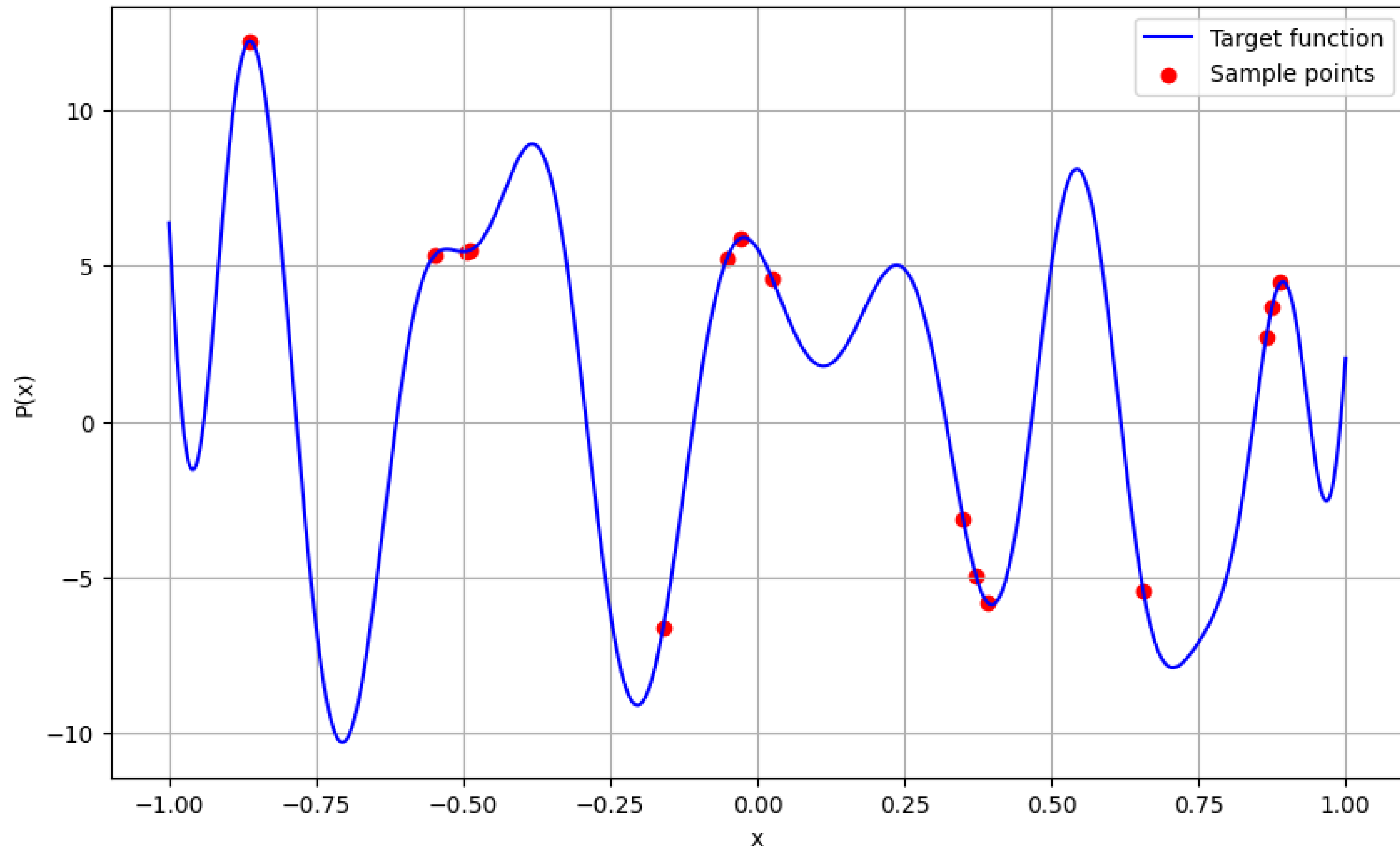


การทดลองเพิ่มเติม

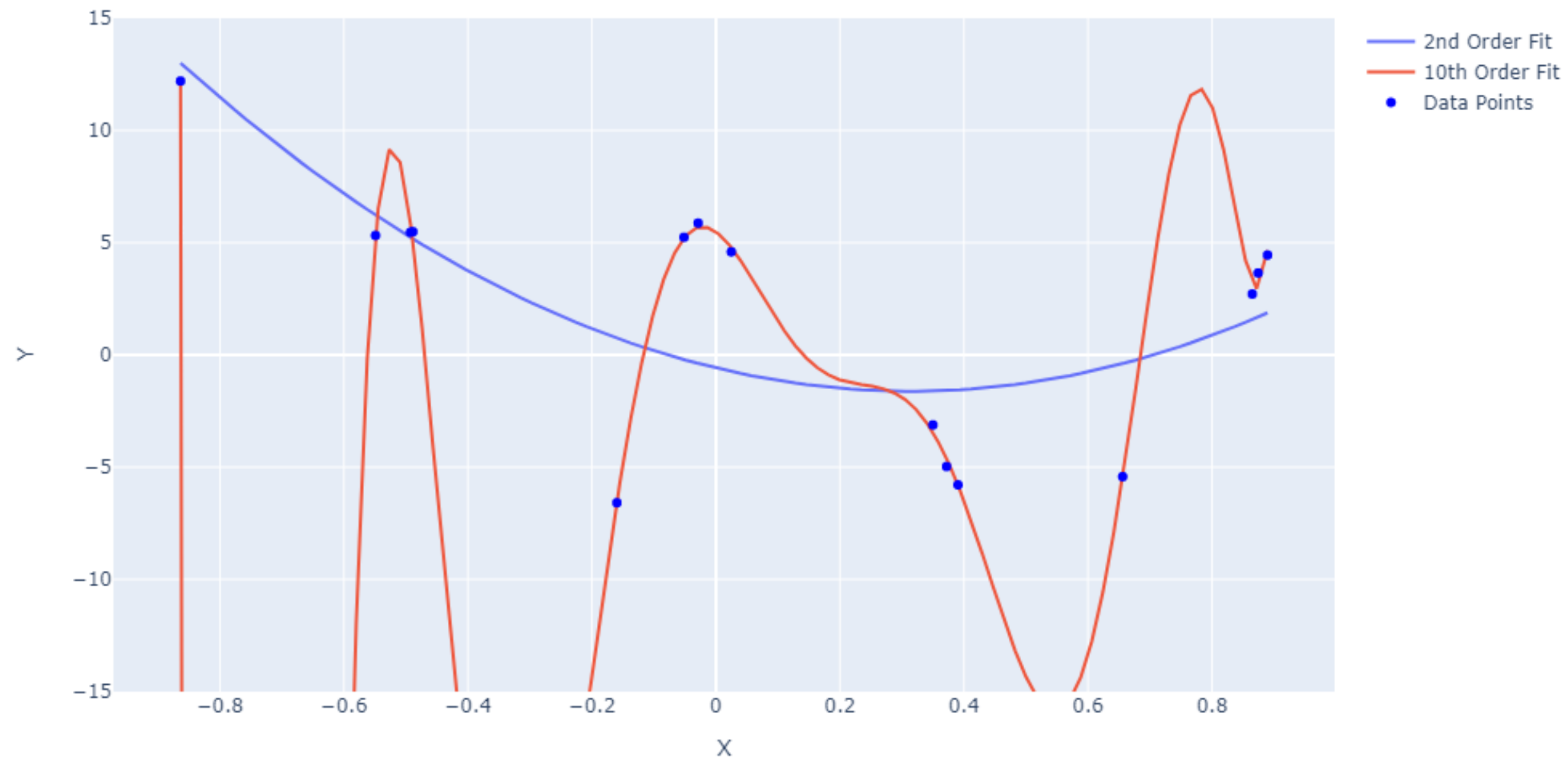
สุ่มจุดมา 15 จุด จาก High order target function

Noiseless high-order Target

50-Degree Polynomial Graph



Data and Polynomial Regression 15 Samples



	2nd Order	10th Order
E_in	3.8418	0.3096
E_out	4.2182	993.9031

2. เขียนโปรแกรมสำหรับการทำ Nested Cross-Validation และ ออกแบบการทดลองเพื่อแสดงให้เห็นถึง ความจำเป็นของการทำสองรูปแบบที่จะ ทำเพียงแค่รูปแบบเดียว

**ผลการทดลอง Estimate ค่า Error ของ
Model ที่มี Hyperparameter ด้วย
Nested Cross Validation และ
Cross Validation**

Linear Regression, Degree 1 - 8

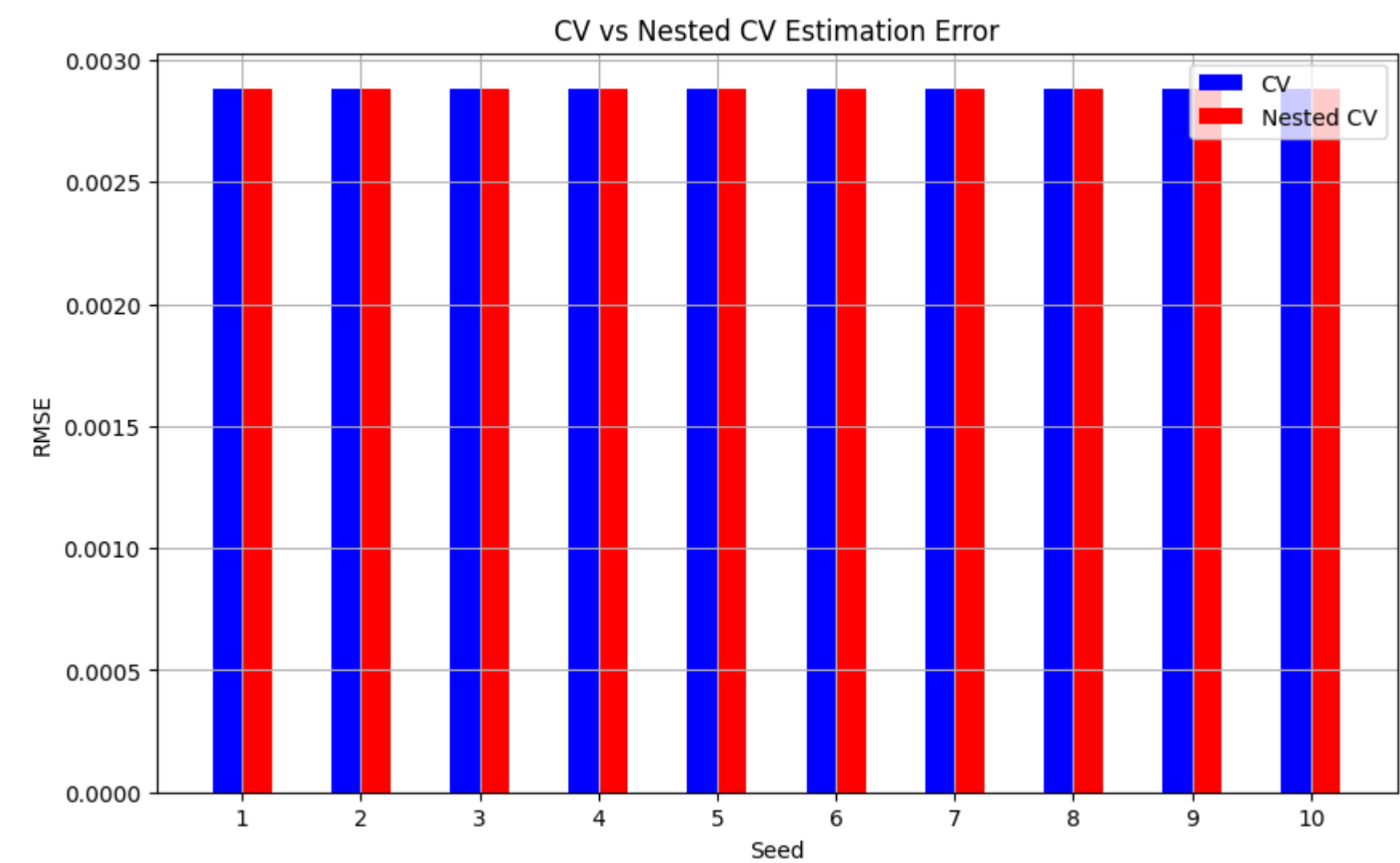
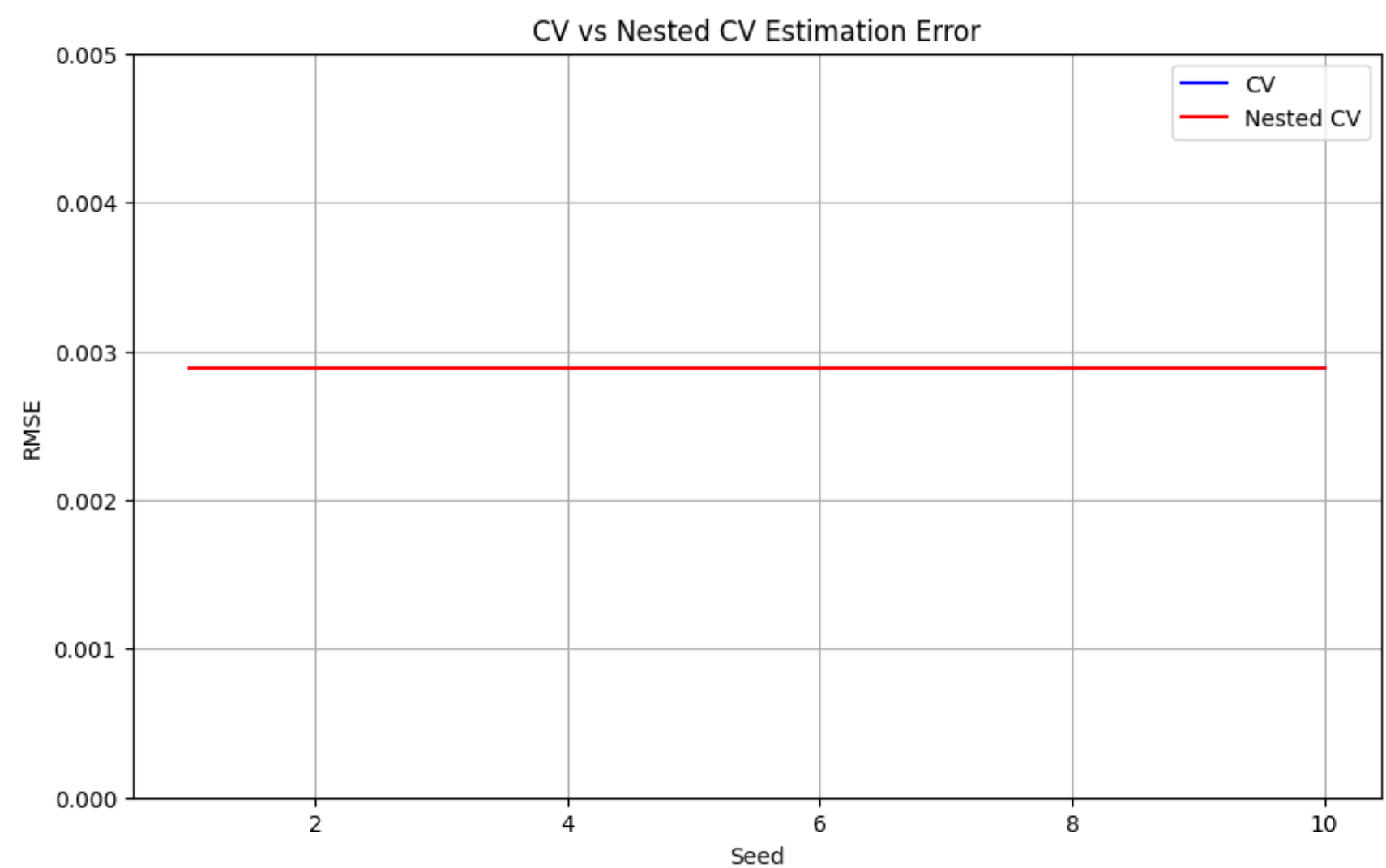
Noiseless Sin

Sample	CV	Nested CV
10	0.0029	0.0029
20	0.0012	0.0016
40	0.0007	0.002
80	0.0005	0.002

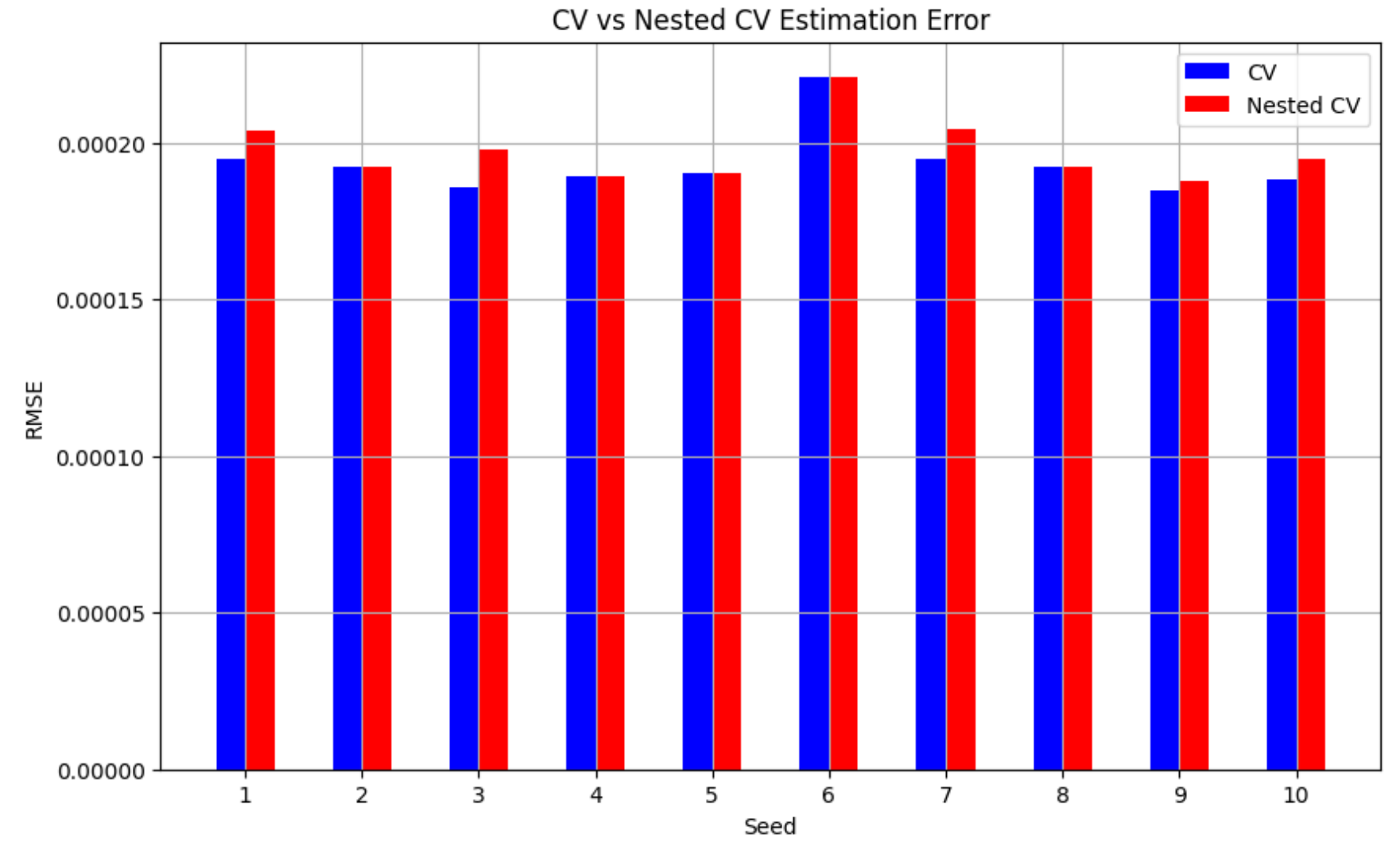
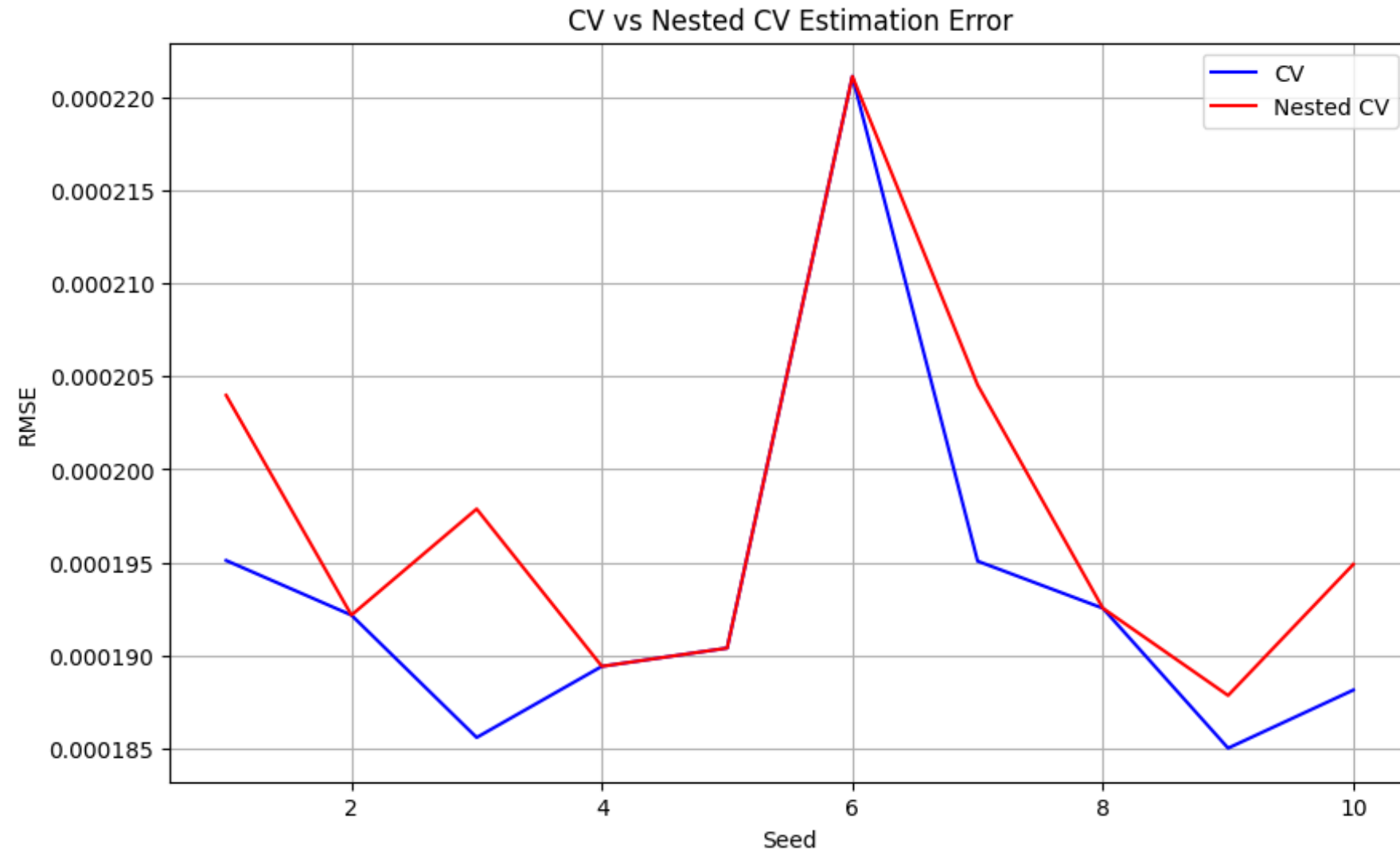
Noisy Sin

Sample	CV	Nested CV
10	0.3355	0.3391
20	0.3154	0.3341
40	0.2827	0.2827
80	0.2987	0.4239

Noiseless Sin, 10 Samples

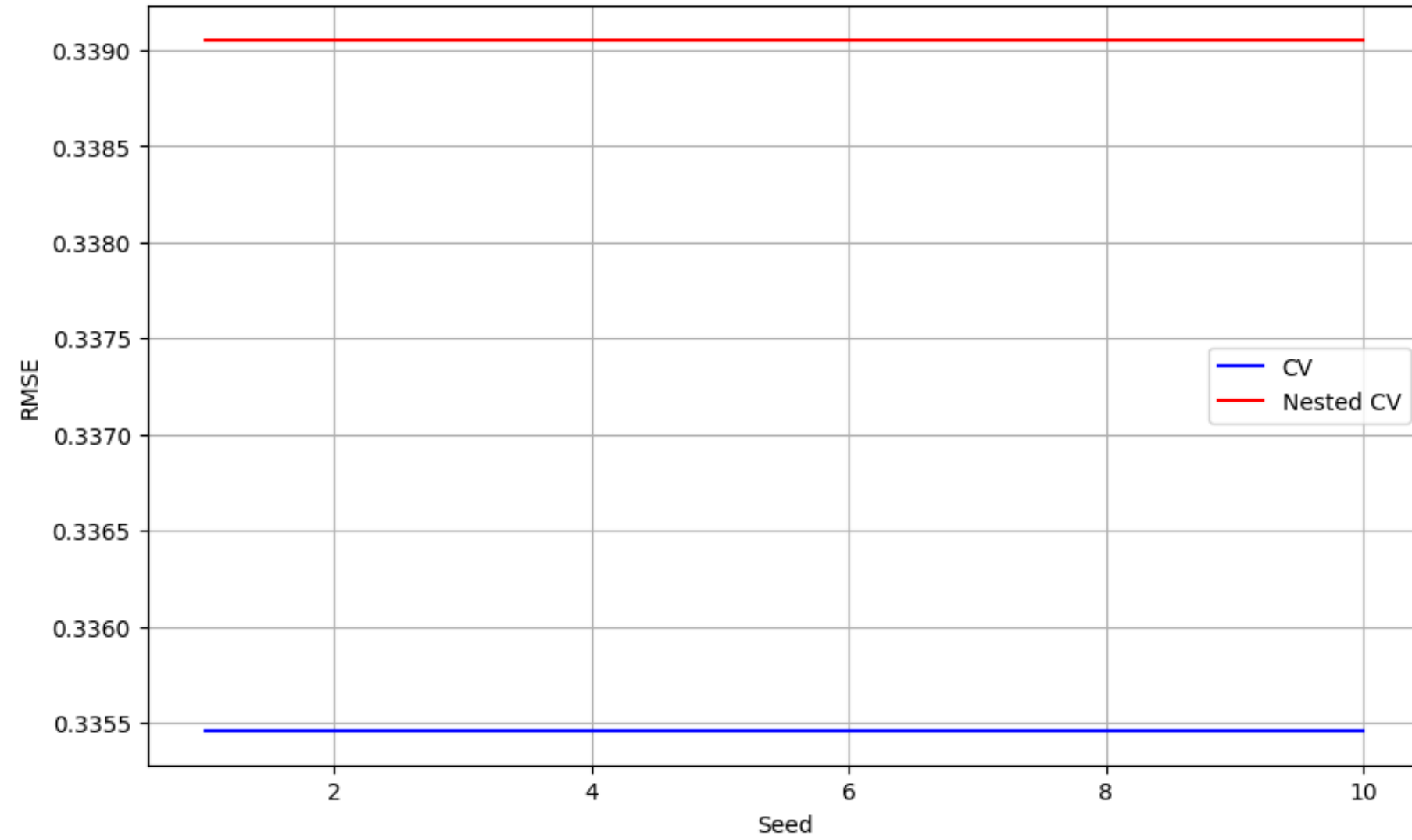


Noiseless Sin, 80 Samples

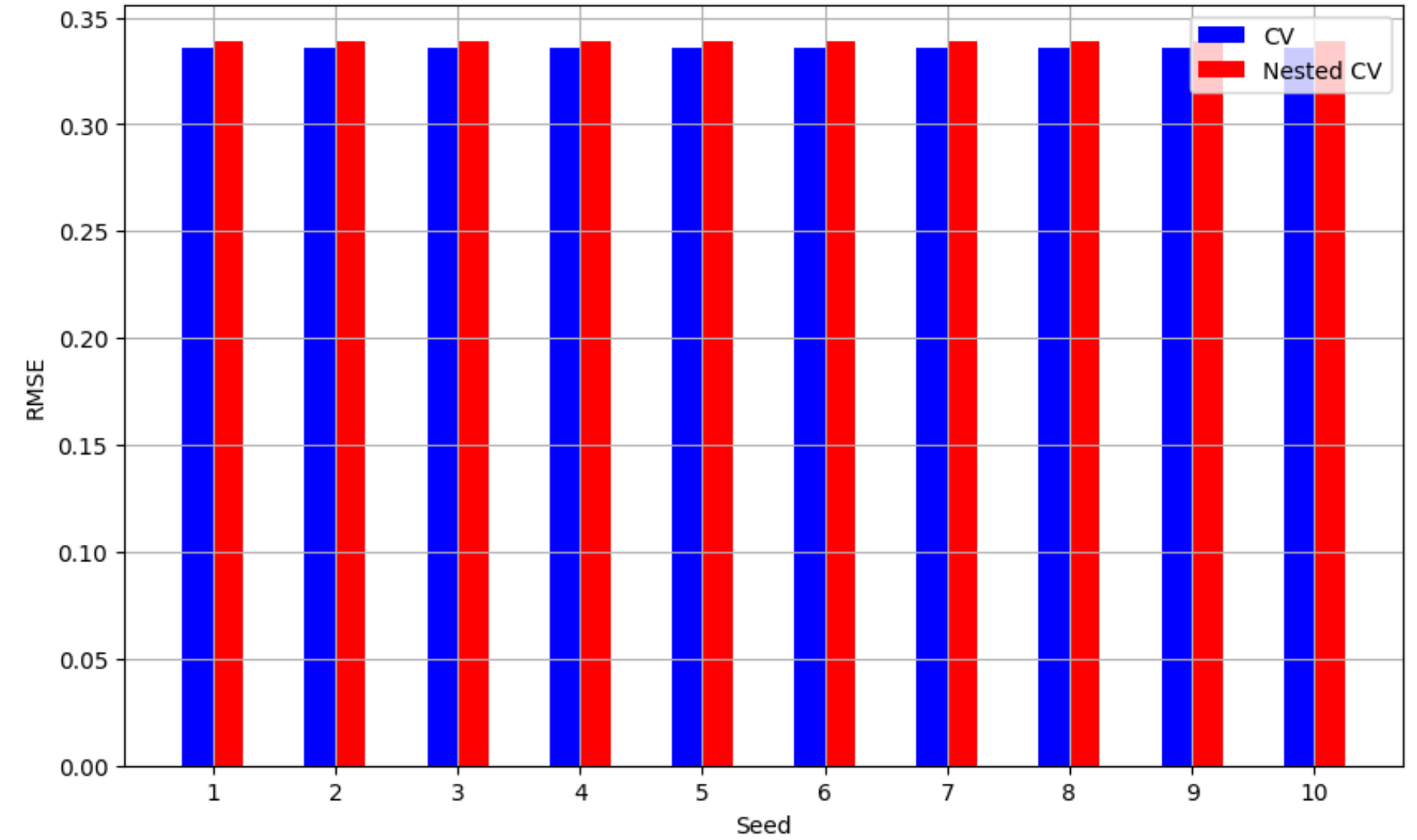


Noisy Sin, 10 Samples

CV vs Nested CV Estimation Error



CV vs Nested CV Estimation Error



Noisy Sin, 80 Samples

