

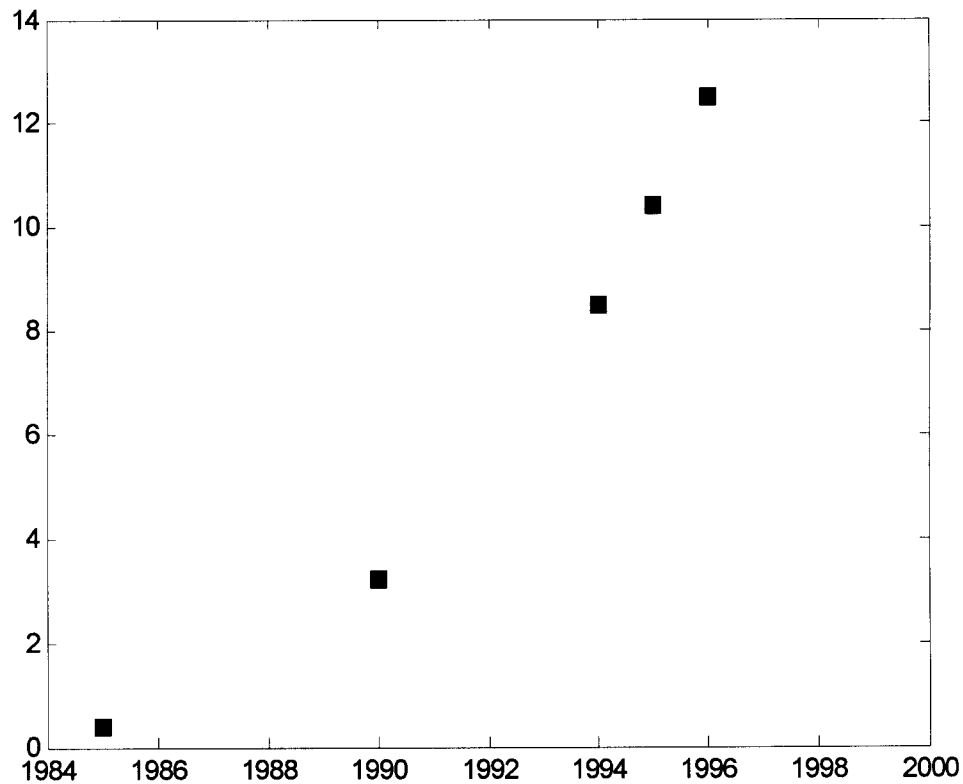
Example of Least Squares Method

This data set gives the cumulative AIDS cases worldwide for several years.

Find the equation of a **cubic** polynomial that best fits these data points:

Year	1985	1990	1994	1995	1996
AIDS cases(millions)	.4	3.2	8.5	10.4	12.5

Use the equation to estimate the number of AIDS cases in 2010.



```
>> X=[0;5;9;10;11]
```

```
X =
```

```
0
```

```
5
```

```
9
```

```
10
```

```
11
```

```
>> Y=[.4;3.2;8.5;10.4;12.5]
```

```
Y =
```

```
0.4000
```

```
3.2000
```

```
8.5000
```

```
10.4000
```

```
12.5000
```

```
>> A=[1 X(1) X(1)^2 X(1)^3;1 X(2) X(2)^2 X(2)^3;1 X(3) X(3)^2 X(3)^3;1 X(4)
X(4)^2 X(4)^3;1 X(5) X(5)^2 X(5)^3]
```

```
A =
```

1	0	0	0
1	5	25	125
1	9	81	729
1	10	100	1000
1	11	121	1331

```
>> S=A'*A
```

```
S =
```

5	35	327	3185
35	327	3185	31827
327	3185	31827	323225
3185	31827	323225	3318627

```
>> W=A'*Y
```

```
W =
```

35
334
3321
33634

```
>> p=inv(S)*W
```

```
p =
```

0.4002
0.2402
0.0520
0.0024

```
>>% The model is  $y = .4002 + .2402x + .0520x^2 + .0024x^3$ 
```

```
>> p(1)+p(2)*25+p(3)*25^2+p(4)*25^3
```

```
ans =
```

76.1568

```
>>% The estimate for 2010 is 76,156,800 cases.
```