

CISC271

Fall 2005

Homework for week 12

in preparation for quiz 5 portion of final exam

Solutions

The following questions are from Recktenwald chapter 9.

Questions 1, 7, 8

9-1 I used Matlab more or less as a calculator to perform the calculations as follows:

```
x = [1 2 4 5 ]
y = [1 2 2 3]
sx = sum(x)
sy = sum(y)
sxy = sum(x.*y)
sxs = sum(x.^2)
alpha = (sx*sy - 4*sxy) / (sx^2 - 4*sxs) = 0.4000
beta = (sx*sxy - sxs*sy)/(sx^2 - 4*sxs) = 0.8000
```

Observe that this yields the same solution as the normal equations.

```
o = [1 1 1 1];
A = [x' o'];
A =
    1    1
    2    1
    4    1
    5    1
```

```
A'*A\A'*y'  
ans =  
    0.4000  
    0.8000
```

9-7 We can use the normal equations to solve each of these individual problems. Observe that the array A is simply a column vector. I will simply give the value of this vector.

a) $A = x$.

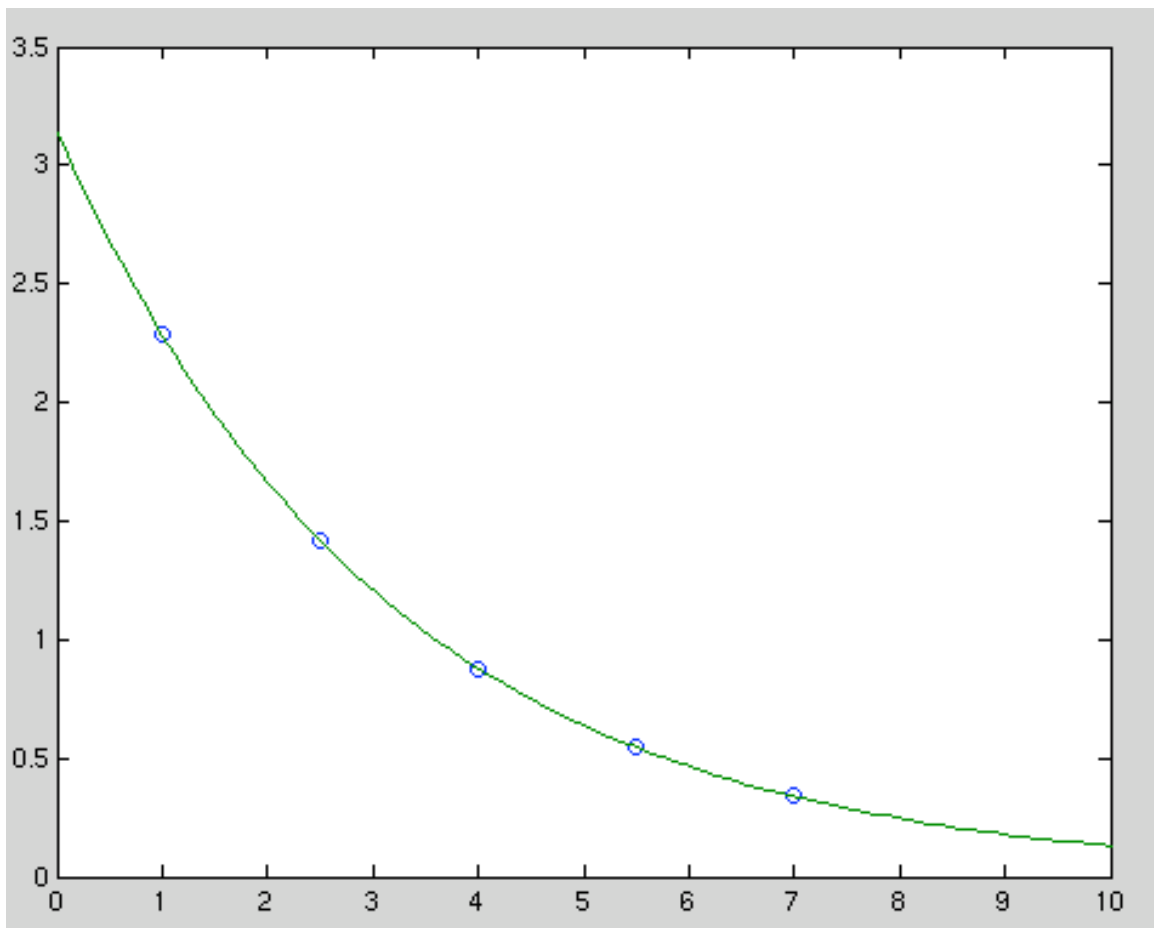
b) $A = xs$, where each element of xs is x_i^2 .

c) $A = lx$ where each element of lx is $\ln x_i$ and $y = ly$ where each element of ly is $\ln y_i$.

9 - 8 Here's my m-file.

```
function c = expfitDR(x,y)  
ly = log(y);  
ctemp = linefit(x,ly);  
c(1) = exp(ctemp(2));  
c(2) = ctemp(1);
```

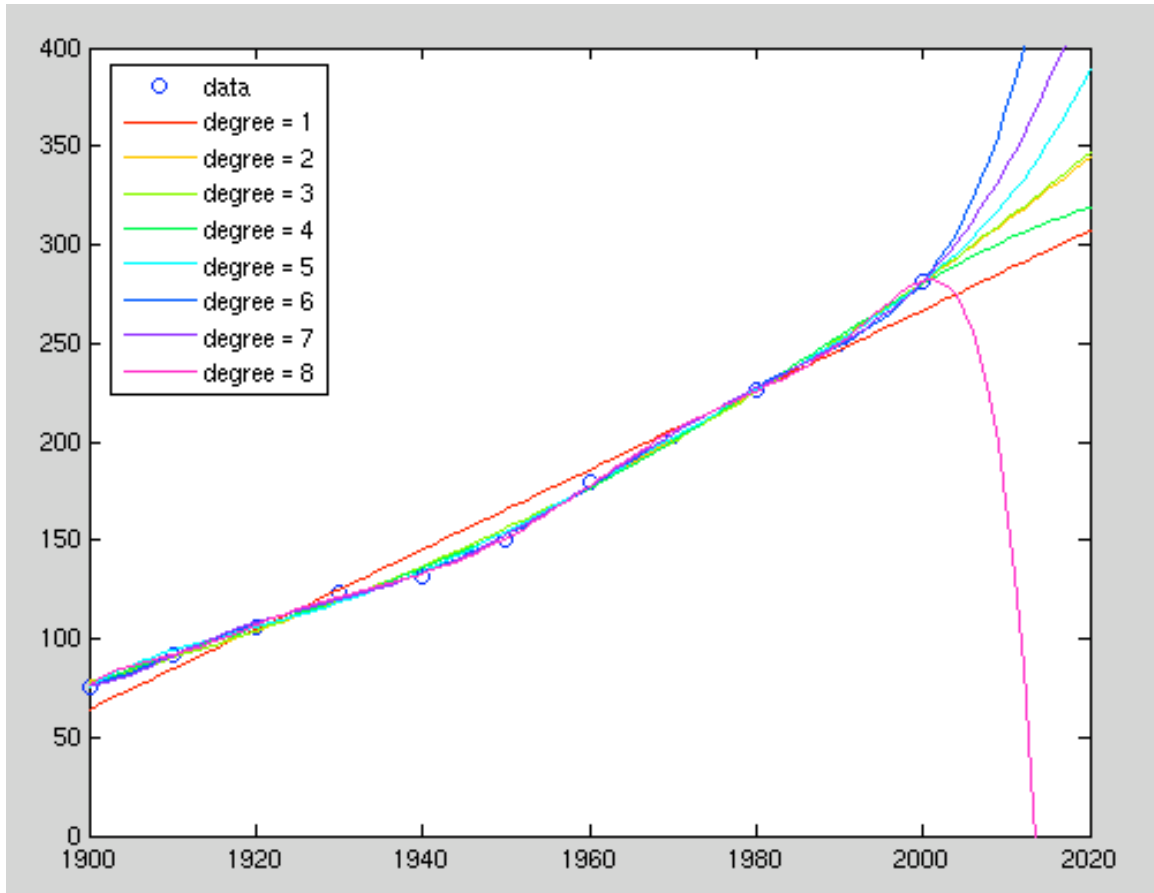
I plotted the curve I got with the given data. It seems to fit exactly! Here is the plot.

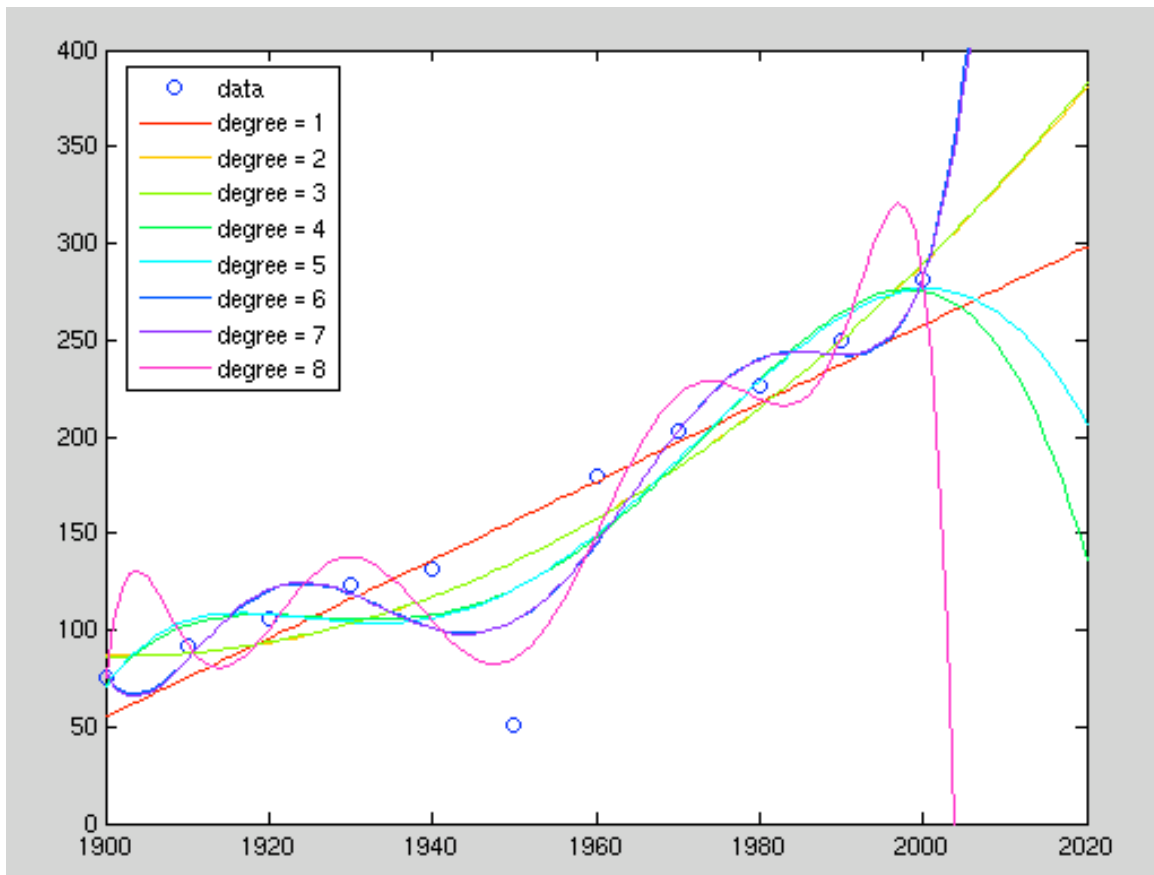


The following questions are from Moler chapter 5, and have to do with experimenting with the censusgui m-file. See section 5.3 of Moler.

Questions 5.2 and 5.3.

5.2 I actually used the Matlab m-file census (type “ help census ”) as it produces a better snapshot of several polynomials at once. The first image is the original followed by the one with the outlier. The outlier seems to have a more pronounced effect on the higher degree polynomials.





5.3 I got the following snippet from Moler's solution to this problem.

```
% Find when population becomes zero.

if any(y(x > 2000) < 0)
    r = roots(c);
    r = r(imag(r)==0 & real(r)>0);
    z = 1950+50*r;
    date = datestr(denum(z,4,1),22);
    text(z-4,-15,date);
    text(z-1,0,'X','color','r','fontweight','bold')
end
```

Here's the output

