

GEOG210A Assignment Week4

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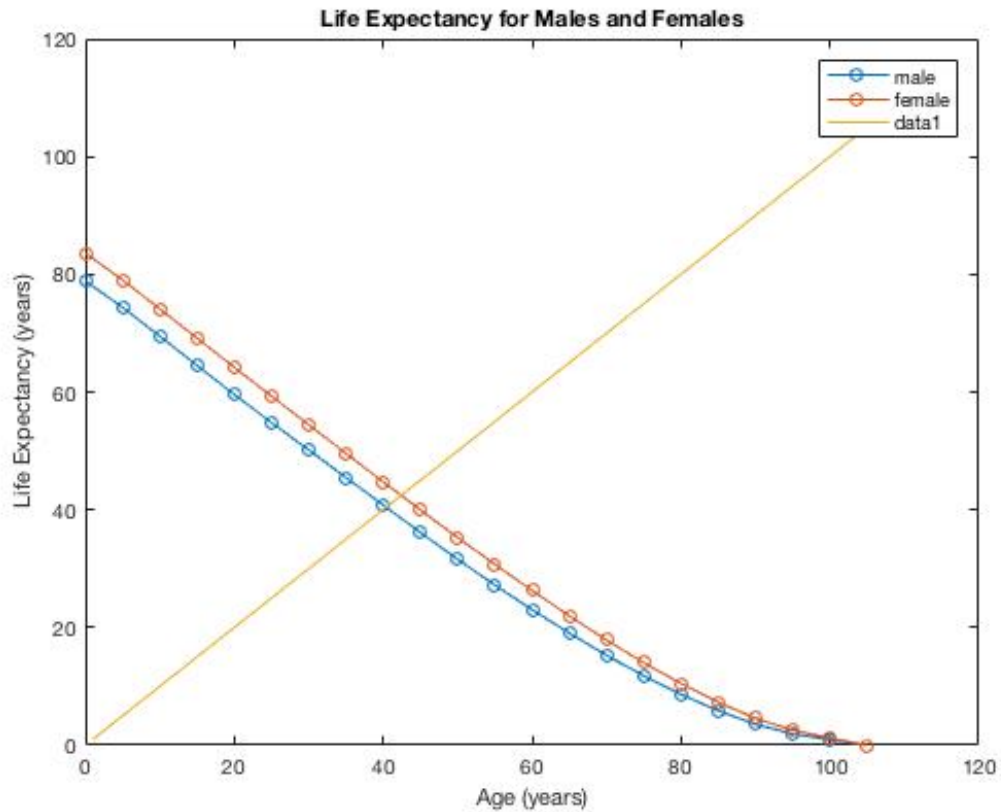
Question1

Download the daily drifter data from the GauchoSpace website. Open the data set in MATLAB.

First calculate the life expectancy for both males and females:

```
% integration, male
dx =5;
b = 105;
a =0;
xb = [0:dx:b];
xa = [0:dx:a];
nxb = length(xb);
nxa = length(xa);
%male
ya_m = lx_m(2.*(xb./dx)+1);
y_int_0_b_m = cumsum(lx_m(2.*(xb./dx)+1).*dx);
%female
ya_f = lx_f(2.*(xb./dx)+1); % population value at age n for females
y_int_0_b_f = cumsum(lx_f(2.*(xb./dx)+1).*dx);
%male
e_m = abs(sum(lx_m(2.*(xb./dx)+1).*dx)-y_int_0_b_m)./ya_m;

%female
e_f = abs(sum(lx_f(2.*(xb./dx)+1).*dx)-y_int_0_b_f)./ya_f;
% plot
figure(1)
plot(xb,e_m,'-o')
hold on
plot(xb,e_f,'-o')
xlabel('Age (years)');
ylabel('Life Expectancy (years)');
title('Life Expectancy for Males and Females');
legend('male','female');
hold on
x = [1:105];
g(x) = x;
plot(x, g(x))
```



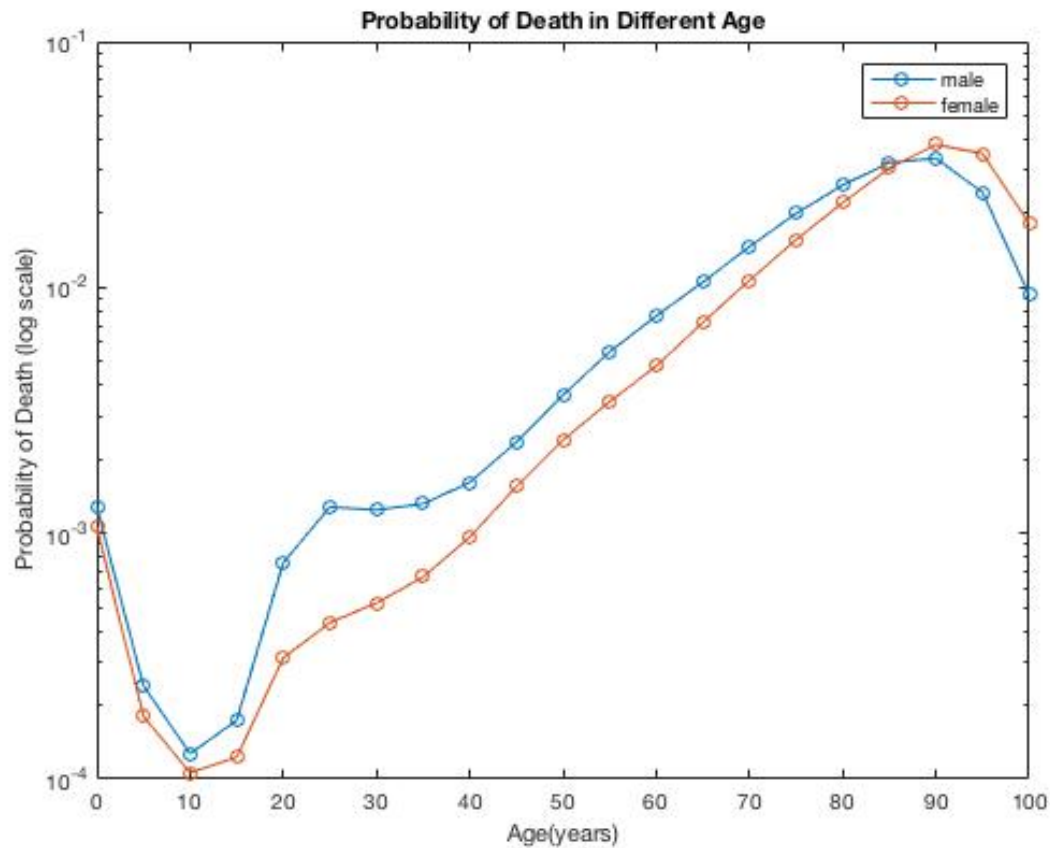
Plot#1

(b) In the plot1, we could see that at around 42 years old, the age for females equals life expectancy, while around 40 for males.

Question2

(a)

```
xb_0 = [0:dx:b-dx];
difyb_m = lx_m(2.*(xb(2:22)./dx)+1)-lx_m(2.*(xb(1:21)./dx)+1); % male
d_b_m = -((lx_m(1)).^(-1)).*(difyb_m./dx); % male
difyb_f = lx_f(2.*(xb(2:22)./dx)+1)-lx_f(2.*(xb(1:21)./dx)+1); %female
d_b_f = -((lx_f(1)).^(-1)).*(difyb_f./dx); % female
% plot
figure(2)
plot(xb_0,d_b_m,'o-');
hold on
plot(xb_0,d_b_f,'o-');
xlabel('Age(years)');
ylabel('Probability of Death (log scale)');
title('Probability of Death in Different Age');
legend('male','female');
set(gca, 'YScale','log')
```



Plot#2

(b)

```
y_int_0_b_m = sum((d_b_m(1:nxb-1)).*dx);
y_int_0_b_f = sum((d_b_f(1:nxb-1)).*dx);
```

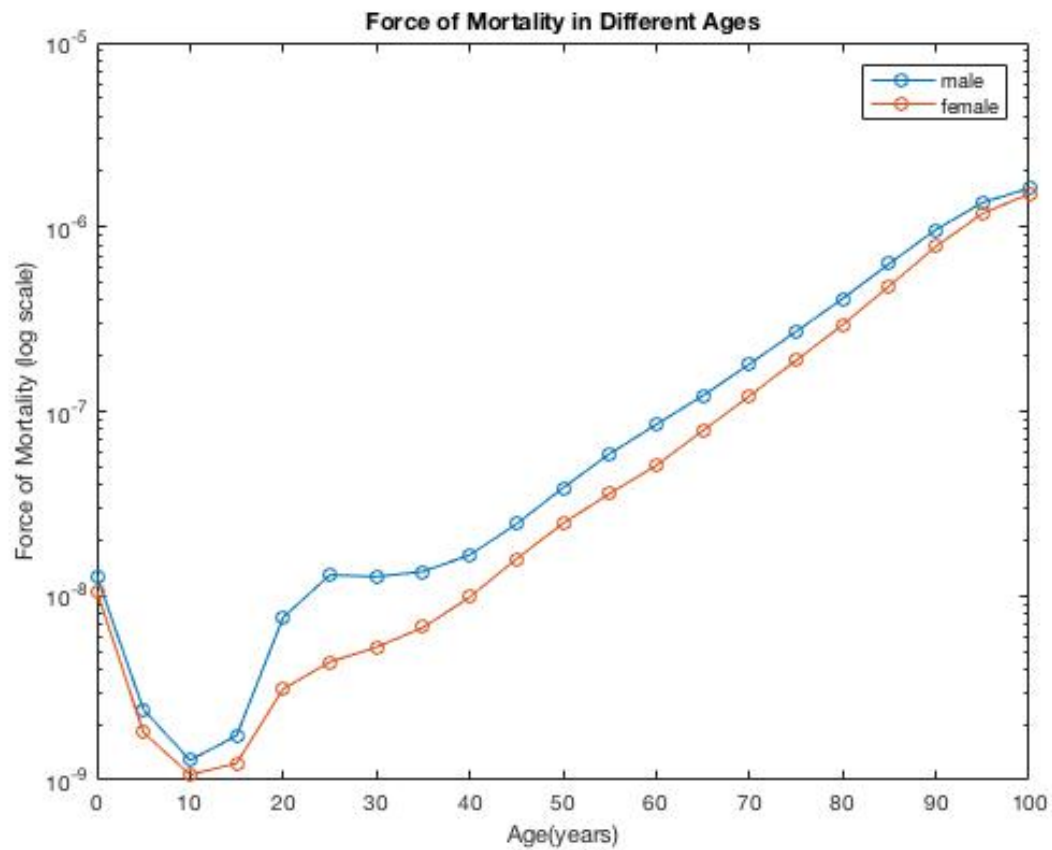
Area under female curve (0.9891) and male curve (0.9705) are both around 1, which means everyone dies eventually.

(c) From plot2, we could know that the most probable age of death for both males and females is 90 years old.

Question3

(a)

```
u_a_m = d_b_m./lx_m(2.*(xb(1:21))./dx+1);
u_a_f = d_b_f./lx_f(2.*(xb(1:21))./dx+1);
figure(3)
plot(xb_0,u_a_m,'o-');
hold on
plot(xb_0,u_a_f,'o-');
xlabel('Age(years)');
ylabel('Force of Mortality (log scale)');
title('Force of Mortality in Different Ages');
legend('male','female');
set(gca, 'YScale','log')
```



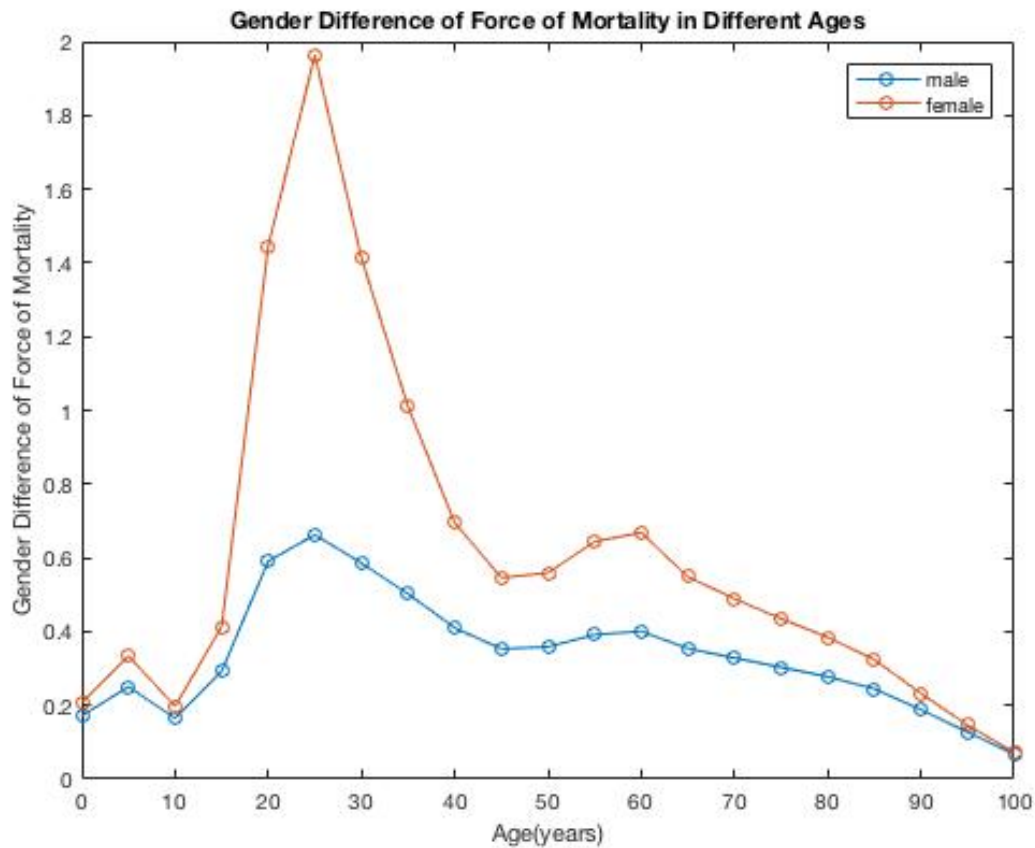
Plot #3

(b)

```

u_d_m = abs(u_a_m - u_a_f) ./ u_a_m;
u_d_f = abs(u_a_m - u_a_f) ./ u_a_f;
figure(4)
plot(xb_0, u_d_m, 'o-');
hold on
plot(xb_0, u_d_f, 'o-');
xlabel('Age(years)');
ylabel('Gender Difference of Force of Mortality');
title('Gender Difference of Force of Mortality in Different Ages');
legend('male', 'female');

```



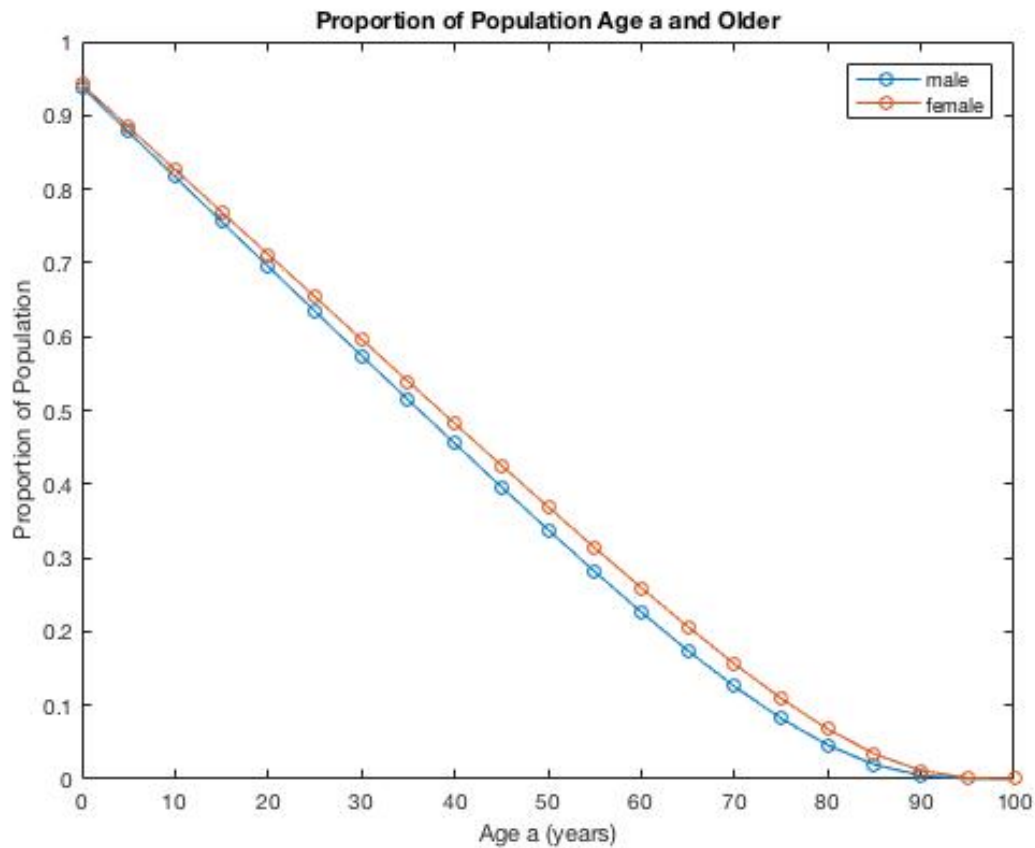
Plot #4

In plot3, the max point of the relative difference for both males and females is around 25 years old.

Question4

(a)

```
C_m = exp(-cumsum(dx./e_m(1:21)));
C_f = exp(-cumsum(dx./e_f(1:21)));
figure(5)
plot(xb_0,C_m,'o-');
hold on
plot(xb_0,C_f,'o-');
xlabel('Age a (years)');
ylabel('Proportion of Population');
title('Proportion of Population Age a and Older');
legend('male','female');
```



Plot#5

(b) From plot5, I could know that the median age for males is around 35, while the median age for females is around 37.

(c) From plot5, I could know that around 24% of the US female population is past the retirement age and 21% of the US male population is past the retirement age.