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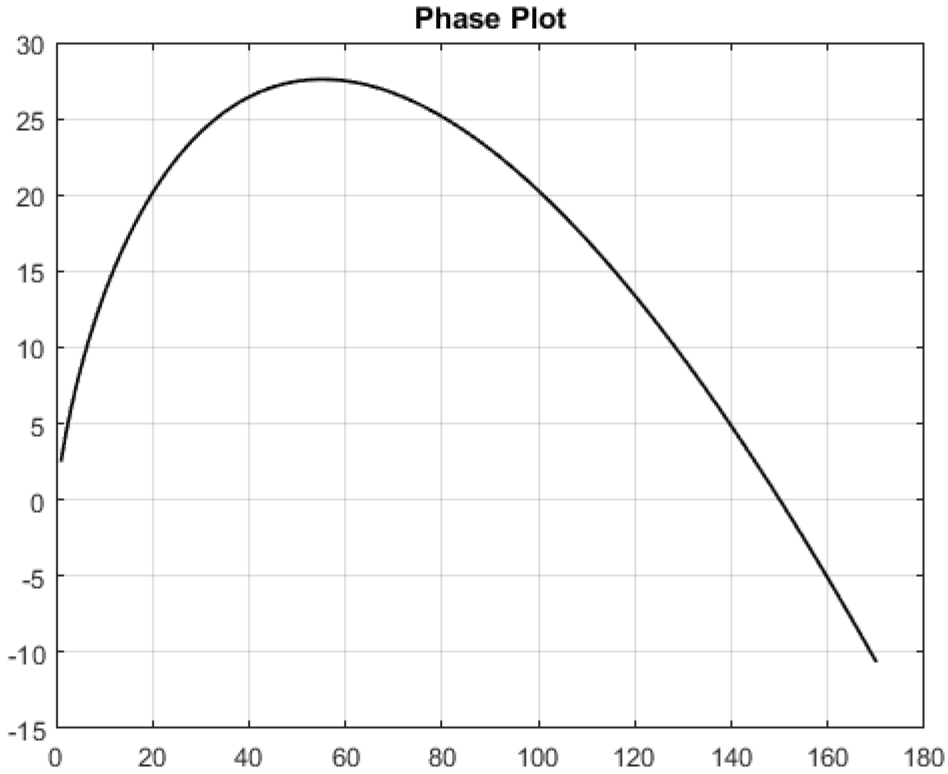
```
%Author: Mario Frakulla
%Date:1/12/2018
```

Part 1

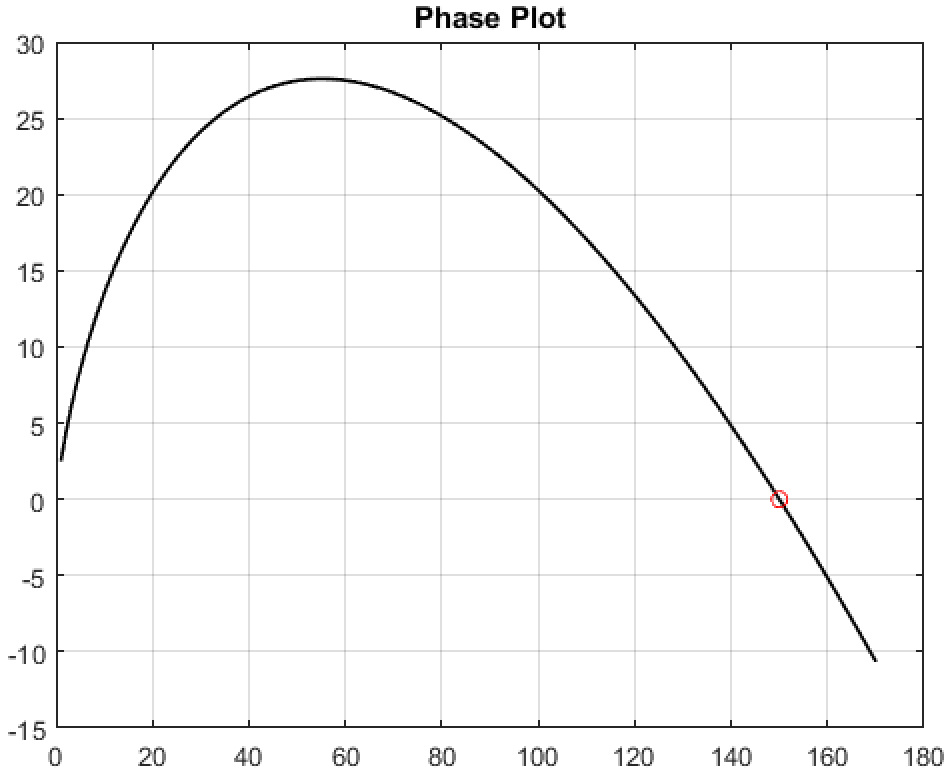
```
beta = 0.5;
k = 150;
v = 0:170;
derivFirst = zeros(1,length(v));
for i = 1:length(v)
derivFirst(i) = beta * v(i) * log(k/v(i));
end
figure(3)

plot(v,derivFirst,'Color', 'Black', 'LineWidth', 1.25)
title('Phase Plot')
grid on
hold on
```



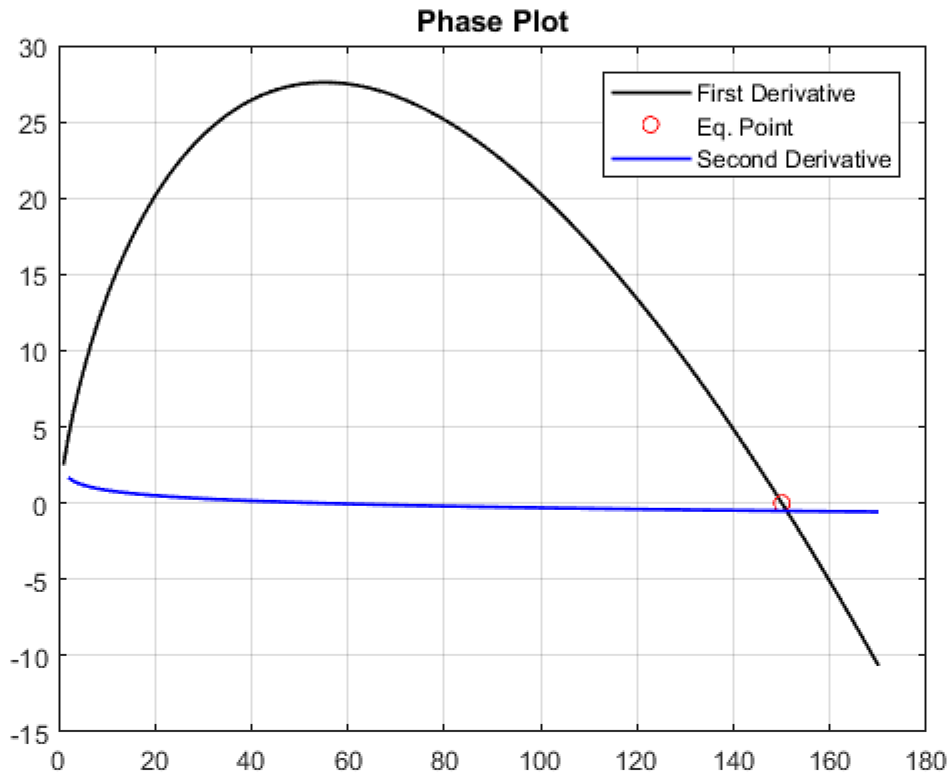
Part 2 (Equilibrium Solutions)

```
[r,c] = find(derivFirst == 0);
plot(v(c),derivFirst(c), 'ro')
```



Part 3

```
derivSecond = gradient(derivFirst);
plot(v, derivSecond,'Color', 'Blue', 'LineWidth', 1.25)
legend('First Derivative','Eq. Point', 'Second Derivative')
```



Part 4

```
%The equilibrium point 150, is a stable equilibrium point
%The ROA is (0, +infinity); In this case the ROA is (0, 170], since we
 took
%the v-values in that range
```

Part 5

```
%We are not able to tell the time value for which the tumor grows to V
 =80
%as the graph does not give any time information
```

Part 8

```
%The results obtained from the dfield tool agrees with the value
 calculated
%in part(4). Also, V = 150 is a stable equilibrium point, as the V
%values converge to 150 from both sides.
```

Part 9

```
%to get V = 140, if V(0) = 20, it takes approximately 6.65 seconds to
 reach
```

```
%this value
```

Part 10

B = 0.2

```
%It takes longer to reach the 140 value,since the coefficient is
 smaller
%than the first case, the aproximate time value is 13 seconds
```

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