```matlab
% Q3
clc
clear
T = [0 100 200 400];
T_m = [4 8.1 11.9 16.1 20];

t=[2 3 4 5];
Thermo = [111.8 115.1 117.9 121.1];
Trans = [107.8 111 114.1 117];

plot(t,Thermo,'LineWidth',2)
hold on
plot(t,Trans,'LineWidth',2)
hold off
title("Thermometer and Transmitter")
ylabel("Temperature (degree Centigrad)")
legend("Thermometer","Transmitter")
xlabel("Time (mins)")
```
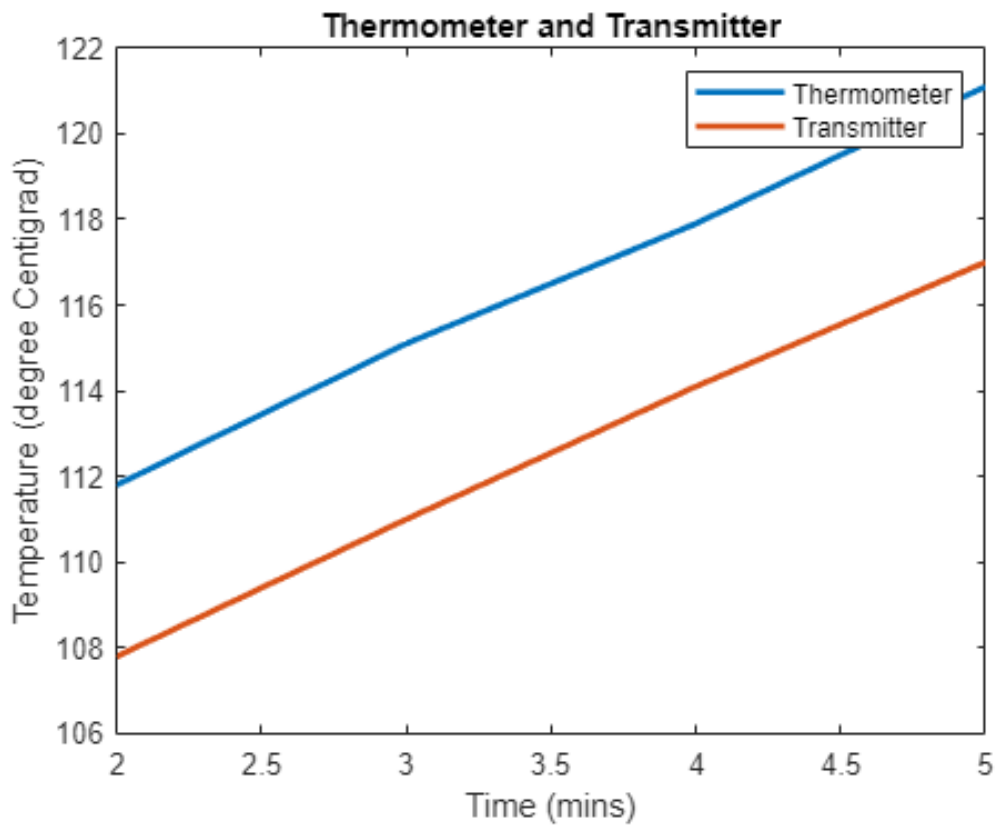


```matlab
x1 = interp1(Thermo,t,112)
```

x1 = 2.0606

```matlab
x2 = interp1(Trans,t,112)
```

x2 = 3.3226

```matlab
del_x = x2-x1
```

```
del_x = 1.2620
```

```
del_x*60
```

```
ans = 75.7185
```

```matlab
% for linear valves
p=5
```
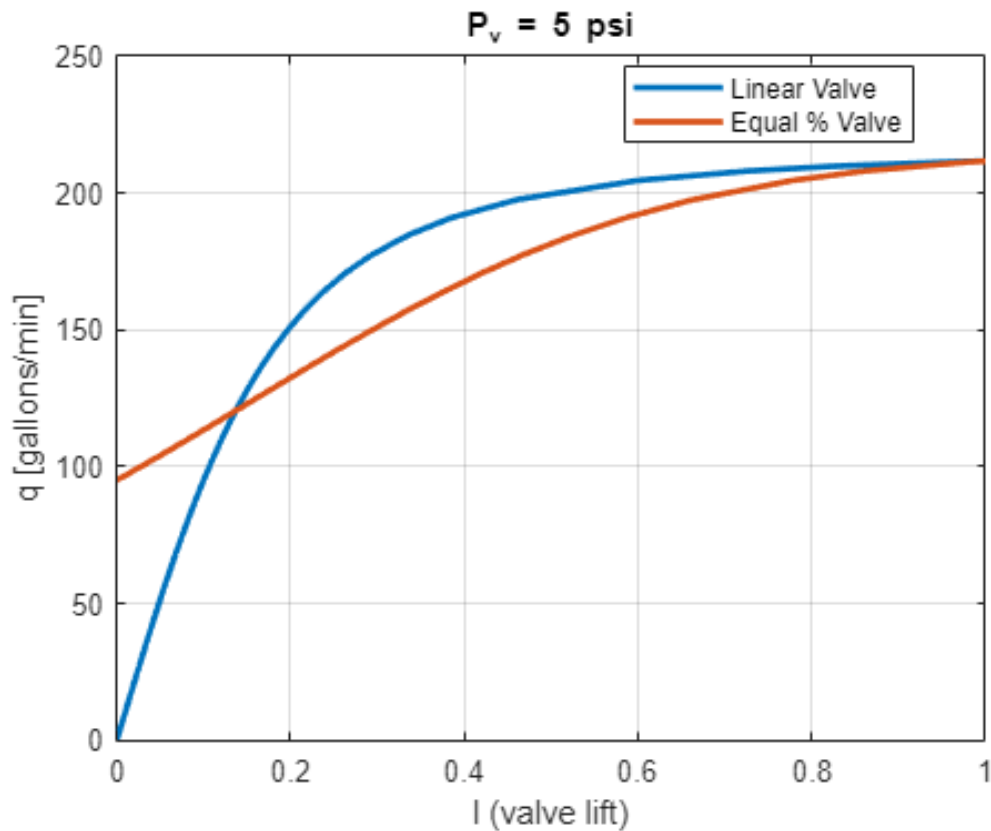
```
p = 5
```

```matlab
l = @(q) ((q/188.5).*((35-0.00075*q.*q)/1.11).^(-0.5));
[Y,X]=fplot(l,[0 300]);
```

Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
grid on
hold on
% for equal %
l = @(q) ( 1 + (log((q/188.5).*((35-0.00075*q.*q)/1.11).^(-0.5)))/log(10));
[Y,X]=fplot(l,[0 300]);
```

Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
legend('Linear Valve', 'Equal % Valve',Location='best')
title('P_v = 5 psi')
hold off
xlabel('l (valve lift)')
ylabel('q [gallons/min]')
```

$P_v = 5$ psi

```matlab
% for linear valves
p=30
```

```
p = 30
```

```matlab
l = @(q) ((q/76.94).*((60-0.00075*q.*q)/1.11).^(-0.5));
[Y,X]=fplot(l,[0 300]);
```
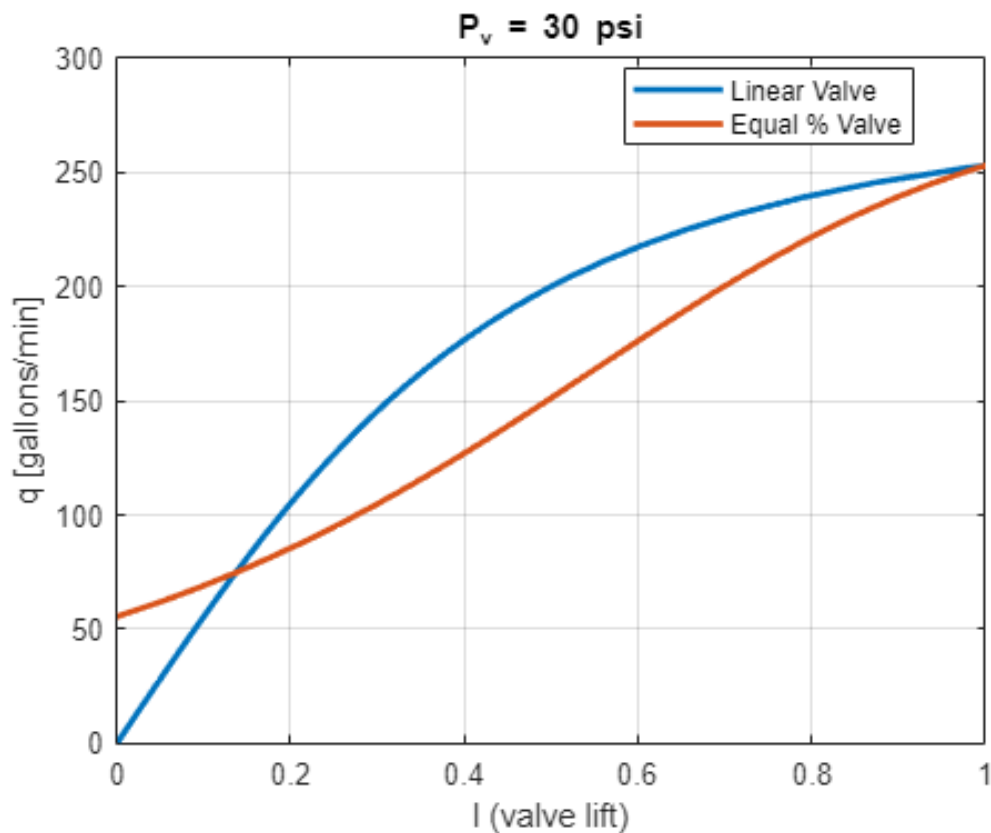
Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
grid on
hold on
% for equal %
l = @(q) ( 1 + (log((q/76.94).*((60-0.00075*q.*q)/1.11).^(-0.5)))/log(10));
[Y,X]=fplot(l,[0 300]);
```

Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
legend('Linear Valve', 'Equal % Valve',Location='best')
title('P_v = 30 psi')
hold off
xlabel('l (valve lift)')
```

```
ylabel('q [gallons/min]')
```



```matlab
% for linear valves
p=90
```

```
p = 90
```

```matlab
l = @(q) ((q/44.42).*((120-0.00075*q.*q)/1.11).^(-0.5));
[Y,X]=fplot(l,[0 300]);
```

Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
grid on
hold on
% for equal %
l = @(q) ( 1 + (log((q/44.42).*((120-0.00075*q.*q)/1.11).^(-0.5)))/log(10));
[Y,X]=fplot(l,[0 300]);
```

Warning: Having two output arguments for fplot will be removed in a future release. Use the XData and YData properties instead.

```matlab
plot(X,Y,LineWidth=2)
xlim([0 1]);
legend('Linear Valve', 'Equal % Valve',Location='best')
title('P_v = 90 psi')
hold off
```

```
xlabel('l (valve lift)')
ylabel('q [gallons/min]')
```