As MATLAB R2020b outputs values to 4 decimal places, the use of 'format long' allows the output values to display all digits.

```
format long
```

Part A: By sourcing the data from the table and aranging them into an array, a linear plot of time vs velocity (t vs v) can be produced. Inside the plot script one can specify the title and axis labels. Line 5 'figure(1)' is designated as this script hold more than one figure thus requires seperation otherwise the figures with overwrite themselves.

```
t = [1.0 2.1 3.3 4.1 4.7 5.8 6.3 7.1 9.1 10.6 11.2 12.0]
```

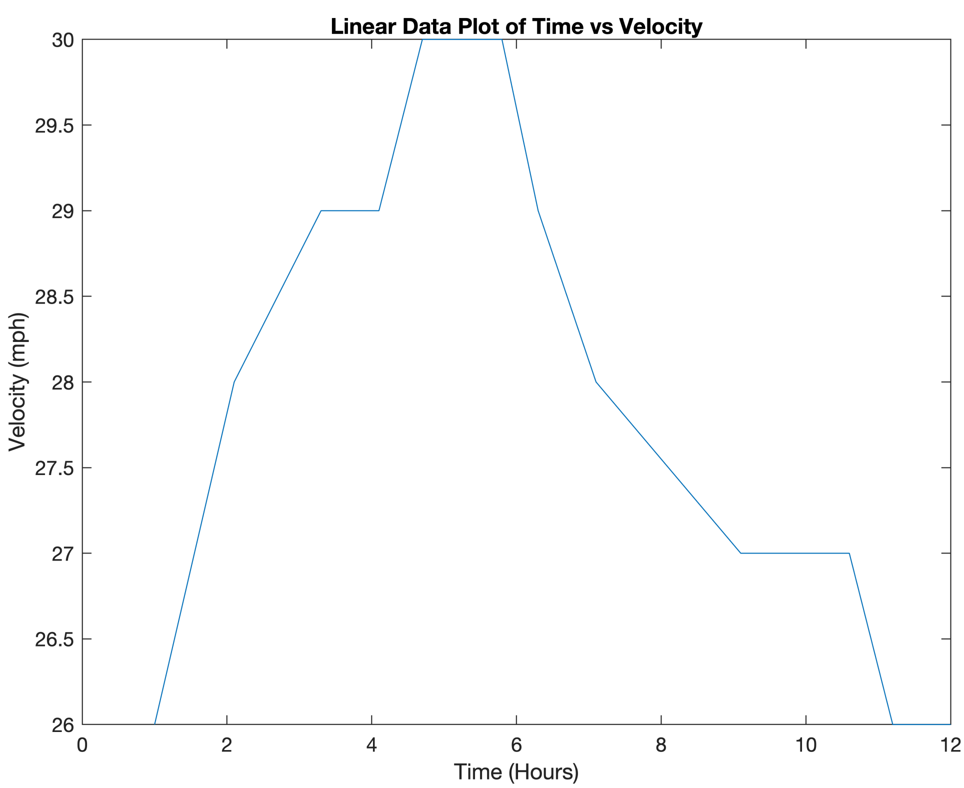
```
t = 1×12
   1.000000000000000   2.100000000000000   3.300000000000000   4.100000000000000 ⋯
```

```
v = [26 28 29 29 30 30 29 28 27 27 26 26]
```

```
v = 1×12
    26    28    29    29    30    30    29    28    27    27    26    26
```

```

figure(1)
plot(t,v)
xlabel('Time (Hours)')
ylabel('Velocity (mph)')
title('Linear Data Plot of Time vs Velocity')
```



Part B: Utilising the 'trapz' command one can use the trapezoidal rule when comapring data, the reason this rule is used is because the velocity was recorded at various times and therefore is not linear for a precise calculation for distance travelled.

```
DistanceMiles = trapz(t,v)
```

```
DistanceMiles =
     3.075500000000000e+02
```

Part C: Using polyfit to interpolate the data for 11th order polynomial by selecting the data arrays (t,v) and the degree/ order of polynomial (,11). Then estimating the speed from the polyfit data one must selectingt he interpolated data (p,) and subject it to the range of values (1hr-12hr) and one can specify the data must be retreived at 02hr intervals. This can be seen on line 12 as the min and max ranges are selected with a parameter in the middle.

```
p = polyfit(t,v,11)
```

```
Warning: Polynomial is badly conditioned. Add points with distinct X values, reduce the degree of
 the polynomial, or try centering and scaling as described in HELP POLYFIT.
p = 1×12
10^2 ×
   0.000000040778371  -0.000002705677547   0.000077702658229  -0.001263868757451 ···
```

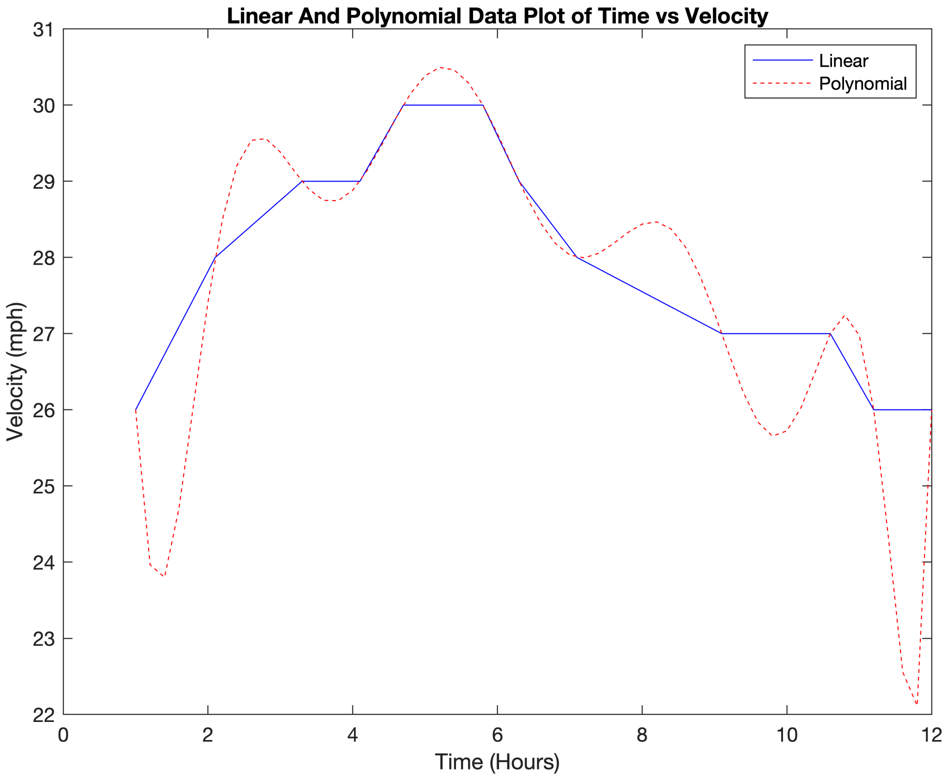
```
Speed = polyval(p,[1:0.2:12])
```

```
Speed = 1×56
  25.999999999716366  23.966070931360342  23.801296086393016  24.710600766853517 ···
```

Part D: To start the figure one must specify the construction of the 2nd figure, after which the plot can be written. Though in this segment of the script two sets of data must be put onto one figure. The use of 'hold on' and 'hold off' is used to retain the current figure made for the plot in line 14, essentially saying we would liek to use the same figure. Adding a legend to specify both data sets is crucial for visual identification. The useof the 'b' and 'r--' is to select the line colour and type, for 'b' means solid black line and 'r--' means red dotted line.

```
figure(2)
plot(t,v,'b')

hold on
plot([1:0.2:12], Speed,'r--');
xlabel('Time (Hours)');
ylabel('Velocity (mph)');
title('Linear And Polynomial Data Plot of Time vs Velocity');
legend('Linear','Polynomial');
hold off
```



Part E: One could estimate the distance travelled by taking data from the graph by applying a polynomial trendline to obtain the average velocity per hour which will give the total miles travelled. Part C requests the use of an 11th degree/ order polynomial but howeve the output script produces a warning "*Warning: Polynomial is badly conditioned. Add points with distinct X values, reduce the degree of the polynomial, or try centering and scaling as described in HELP POLYFIT.*" this i because the starting value for the velocity is calculated lower in velocity than its linear counterpart.