Table of Contents

Clear Workspace

```
close all;
clear;
clc;
```

Given Data

```
l = 10/3.281; % Wheelbase (m)
a = 0.6*l; % Length of CG from front axle (m) for 40% front load
b = 0.4*l; % Length of CG from rear axle (m) for 40% front load
v = 66/3.281; % Velocity (m/s)
d = deg2rad(-40); % Steering wheel angle (rad)
G = 16; % Steering ratio
M = 3200*1.3558; % Stabilizing moment (Nm)
r = deg2rad(-12); % Yaw rate (rad/s)
```

1.5

```
R = abs(l/tan(d/G));
fprintf('Ans 1.5: The path radius (R) is %f m\n\n',R)
```

```
Ans 1.5: The path radius (R) is 69.807271 m
```

1.3

```
Nr = M/r;
fprintf('Ans 1.3: The yaw damping derivative (Nr) is %f Nms/rad\n\n',Nr)
```

```
Ans 1.3: The yaw damping derivative (Nr) is -20715.098097 Nms/rad
```

1.4

```
C = [a,-b;(a^2/v),(b^2/v)]\[0;Nr];
Cf = C(1);
Cr = C(2);
```

```
fprintf('Ans 1.4: The front (Cf) and rear (Cr) cornering stiffnesses are %f
 and %f N/rad\n\n',Cf,Cr)
```

Ans 1.4: The front (Cf) and rear (Cr) cornering stiffnesses are -74762.860542 and -112144.290813 N/rad

1.2

```
Nd = -a*Cf;
fprintf('Ans 1.2: The control moment derivative (Nd) is %f Nm/rad\n\n',Nd)
```

Ans 1.2: The control moment derivative (Nd) is 136719.647440 Nm/rad

1.1

```
NB = a*Cf - b*Cr;
fprintf('Ans 1.1: The static stability derivative (NB) is %f Nm/rad\n\n',NB)
```

Ans 1.1: The static stability derivative (NB) is 0.000000 Nm/rad

Published with MATLAB® R2022a