**ANSWER 1A:**

UG should be between 0.002790 to 0.006278 rad-s2-m-1

**ANSWER 1B:**

Maximum steering sensitivity is 5.376344 s-1

**ANSWER 1C:**

Steering wheel angles at 80 kph & 120 kph are 1.192725 rad & 0.530100 rad

**ANSWER 2A:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Front Load**  **(%)** | **\*1e5**  **(N/rad)** | **\*1e5**  **(N-s/rad)** | **\*1e5**  **(N/rad)** | **\*1e5**  **(N-m/rad)** | **\*1e5**  **(N-m-s/rad)** | **\*1e5**  **(N-m/rad)** |
| 60% | -1.7840 | 0.0365 | 0.8920 | 0.4894 | -0.2603 | 0.9788 |
| 50% | -1.7840 | 0 | 0.8920 | 0 | -0.2502 | 1.2234 |
| 40% | -1.7840 | -0.0365 | 0.8920 | -0.4894 | -0.2603 | 1.4681 |

**ANSWER 2B:**

Stability factor at 60% front load is 0.001431 rad-s2-m-2

Stability factor at 50% front load is 0.000000 rad-s2-m-2

Stability factor at 40% front load is -0.001431 rad-s2-m-2

**ANSWER 2C:**

Critical speed at 60% front load is (0.000000 + 26.431010 j) m/s (i.e. DOES NOT EXIST!)

Critical speed at 50% front load is (0.000000 + Inf j) m/s (i.e. DOES NOT EXIST!)

Critical speed at 40% front load is (26.431010 + 0.000000 j) m/s (i.e. 26.431010 m/s)

**ANSWER 2D:**

Distance from the neutral steer point to the front tire is 1.371533 m

**ANSWER 2E:**

Stability factor at 60% front load is 0.100000

Stability factor at 50% front load is 0.000000

Stability factor at 40% front load is -0.100000

|  |  |
| --- | --- |
| **ANSWER 2F:** | **ANSWER 2G:** |
| Chart, line chart  Description automatically generated | Chart, line chart  Description automatically generated |

**NOTE:** Following results were obtained using [MATLAB’s ode45 nonstiff ODE solver](https://www.mathworks.com/help/matlab/ref/ode45.html), which is based on an explicit Runge-Kutta (4,5) formula, the Dormand-Prince pair.

|  |  |
| --- | --- |
| **ANSWER 3A:** | **ANSWER 3B:** |
|  |  |
| **ANSWER 3C:** | **ANSWER 3D:** |
|  |  |