1- An automobile of mass 1000 kg moves on a level horizontal road in a circle of radius 30 m. The maximum frictional force between tires and road is 500 N. Calculate the maximum speed with which this car can round this curve.

\[
F_k = m \frac{v^2}{r}
\]

\[
500 \text{ N} = 1000 \frac{v^2}{30}
\]

\[
v = \sqrt{\frac{30 \times 500}{1000}} = 3.87 \text{ m/s}
\]

2- Find the distance from Earth’s center at which the net gravitational force from both Earth and Moon cancel each other \((F_{\text{net}} = 0)\).

\[M_{\text{earth}} = 6 \times 10^{24} \text{ kg} \quad M_{\text{moon}} = 7 \times 10^{22} \text{ kg}\]

Distance from Earth’s center to Moon’s center = \(4 \times 10^8 \text{ m}\)

\((\text{Hint: start by placing an object of mass } m \text{ at that point})\)

\[
F_{\text{net}} = 0 \\
\Rightarrow F_{\text{earth}} = F_{\text{moon}}
\]

\[
\frac{G m \cdot M_{\text{earth}}}{x^2} = \frac{G m \cdot M_{\text{moon}}}{(4 \times 10^8 - x)^2}
\]

\[
\frac{6 \times 10^{24}}{x^2} = \frac{7 \times 10^{22}}{(4 \times 10^8 - x)^2}
\]

\[
\frac{6 \times 10^{24}}{x^2} = \frac{2.6 \times 10^{11}}{4 \times 10^8 - x}
\]

\[
x = 3.6 \times 10^8 \text{ m}
\]