Problem 1 (5 points)

A torque of 700 lb-ft is transmitted through the five bolts of a rim. The bolts are at a distance of 8 cm from the center of the rim. Neglect friction.

Compute the force in each bolt, state your assumptions and use appropriate diagrams.

Problem 2 (10 points)

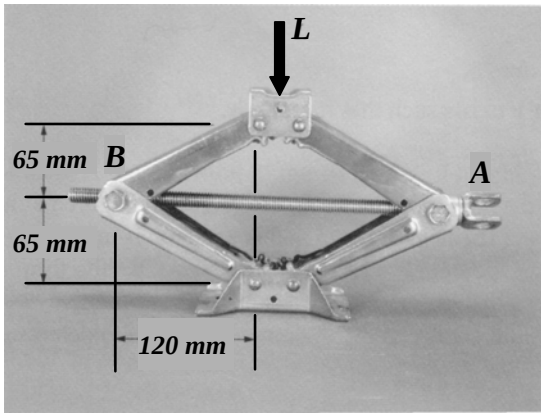
You are driving your brand new SMART on the streets in Montreal. Unfortunately you drive in a major pothole and one of your tires has a flat. So here you are, having to install the spare wheel and you use a screw jack to lift the car.

With the following information:

- Total mass of the car is 900 kg
- The car has four wheels
- The car center of gravity is roughly at the same distance from all the wheels
- The jack is placed very close the position of the damaged wheel

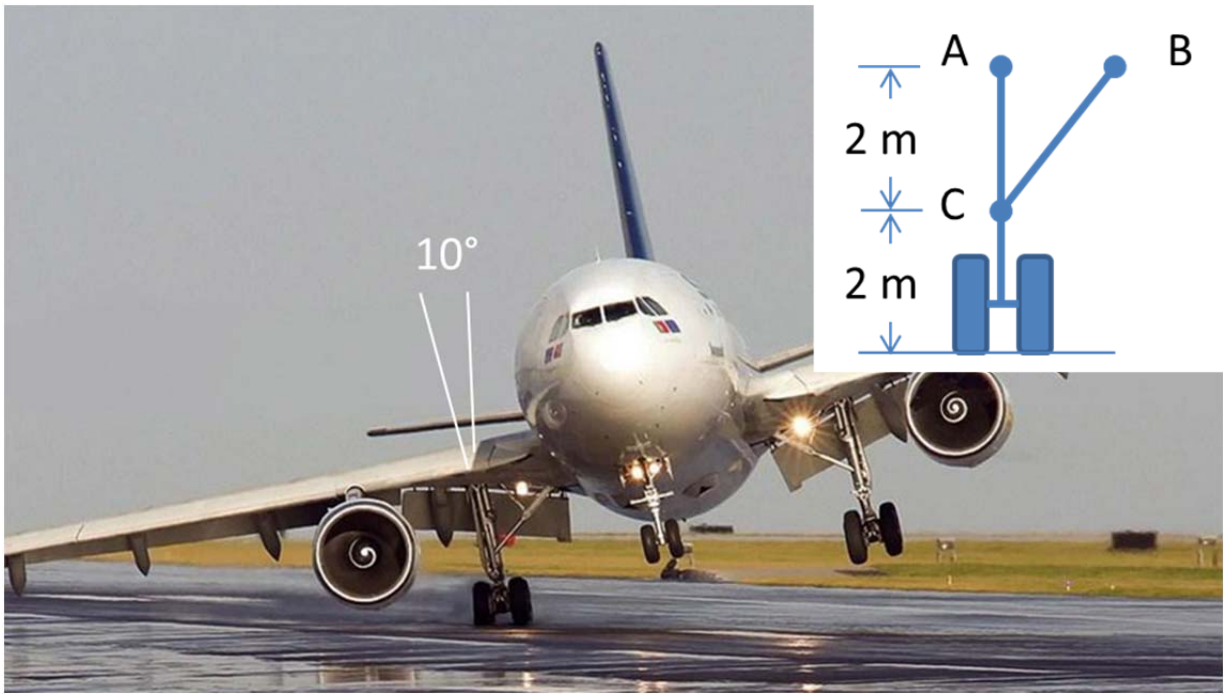
a) *Calculate the force L applied on the jack when the damaged wheel does not touch the ground and the other three wheels touch the ground*

b) *Calculate the tension in the threaded shaft between A and B in the position shown*



Problem 3 (5 points)

An airplane is landing on one of its main landing gear as shown. The vertical load on the tires is 2g and the lateral load is 0.5g. The landing gear can be simplified as shown where A, B and C can be considered as pin joints: The angle ACB is 45°.



Find the support reactions at A and B.

Problem 4 (5 points)

Please draw a free body diagram of a structure, machine, object of your choice.
Include the picture and source of the structure (location, description, etc)
Explain the forces or moments represented (active forces, reactions, gravity)

No need to show dimensions
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DO NOT USE MATERIAL FROM THE TEXTBOOK, USE REAL STRUCTURES.