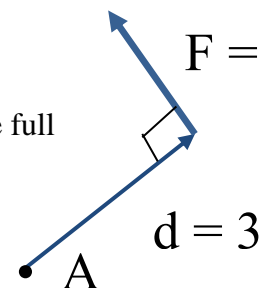


Practice Problems - 06

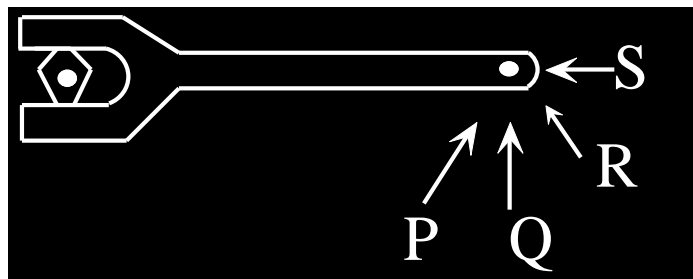
Practice problems are supposed to help you digest the content of the lecture. It is important that you manage to solve them on your own. Before you write your solutions, you may of course ask questions, and discuss things. In order to prepare for the exam, already now, try to explicitly write down your solutions – clearly and easy to read. Apply definitions properly, and give explanations for what you are doing. That will help you to understand them later when you prepare for the final exam.

I. Rigid Bodies

- 1) What is the moment of the force about point A (M_A)? Write the full formula.



- 2) If a force of magnitude F can be applied in 4 different 2-D configurations (P, Q, R, S), define the two cases (Max, Min) resulting in the maximum and minimum torque values on the nut, and explain why.



- 3) If $M = r \times F$, then what will be the value of $M \cdot r$ and why?
- 4) Using the counter-clockwise direction as positive, calculate the net moment of the two forces about point P.



- 5) If $r = 5j$ m and $F = 10k$ N, calculate the moment.
- 6) If $r = i + 2j$ m and $F = 10i + 20j + 30k$ N, calculate the moment of F about the y-axis.

II. URDF

- 1) Make appropriate modifications to the following lines to represent a correct URDF and draw the correspondent tree:

```
<robot name="Robot1">
  <link name="link1">
  <link name="link2">
  <link name="link3">
  <link name="link4">

  <joint name="joint1">
    <parent link="link1"/>
    <child link="link3"/>
  </joint>

  <joint name="joint2">
    <parent link="link1"/>
    <child link="link2"/>
  </joint>

  <joint name="joint3">
    <parent link="link3"/>
    <child link="link3"/>
  </joint>
</robot>
```

```
<robot name="Robot1">
  <link name="link1"/>
  <link name="link2"/>
  <link name="link3"/>
  <link name="link4"/>

  <joint name="joint1">
    <parent link="link1"/>
    <child link="link3"/>

  <joint name="joint2">
    <parent link="link1"/>
    <child link="link2"/>

  <joint name="joint3">
    <parent link="link2"/>
    <child link="link2"/>
```

```
<robot name="Robot1">
  <link name="link1"/>
  <link name="link2"/>
  <link name="link3"/>
  <link name="link4"/>

  <joint name="joint1">
    <parent link="link1"/>
    <child link="link3"/>

  <joint name="joint2">
    <parent link="link1"/>
    <child link="link2"/>

  <joint name="joint3">
    <parent link="link3"/>
    <child link="link3"/>
</robot>
```