Part I: Newton’s Laws
Chapter 7: Newton’s Third Law

7.4 Ropes and Pulleys
7.5 Examples of Interacting-Objects Problems
Approximations make things more manageable.

- “Massless” ropes.
- “Massless” pulleys.
- “Frictionless” axles.

Result: $|\vec{T}|$ is the same on both blocks (and throughout the rope).

- Non-stretchy rope.

Result: $|\vec{a}_A| = |\vec{a}_B| = a$. 

The accelerations have the same magnitude.
For you to do: Solve symbolically for $|\vec{a}_A| = |\vec{a}_B| = a$ with $m_A$ and $m_B$ as knowns. Take the surface/A interface to be frictionless.

You will need to isolate each block (two separate N2L analyses). There are two methods, you can take your pick:

**Method 1:** Choose “standard” axes.
- Advantage: Things seem more like what you are accustomed to.
- Disadvantage: You must be VERY careful with the $m\vec{a}$ side of N2L. A sign error in one of your N2L component equations is very common.

**Method 2:** Choose positive direction along $\vec{a}$, different local axes for each object.
- Advantage: Sign errors are much less common!
- Disadvantage: Local axes for each object feels strange at first. Just remind yourself that any relationship between the symbols that you build with any axis is valid!

1Whichever method you choose, find ways to test if your answer seems reasonable!