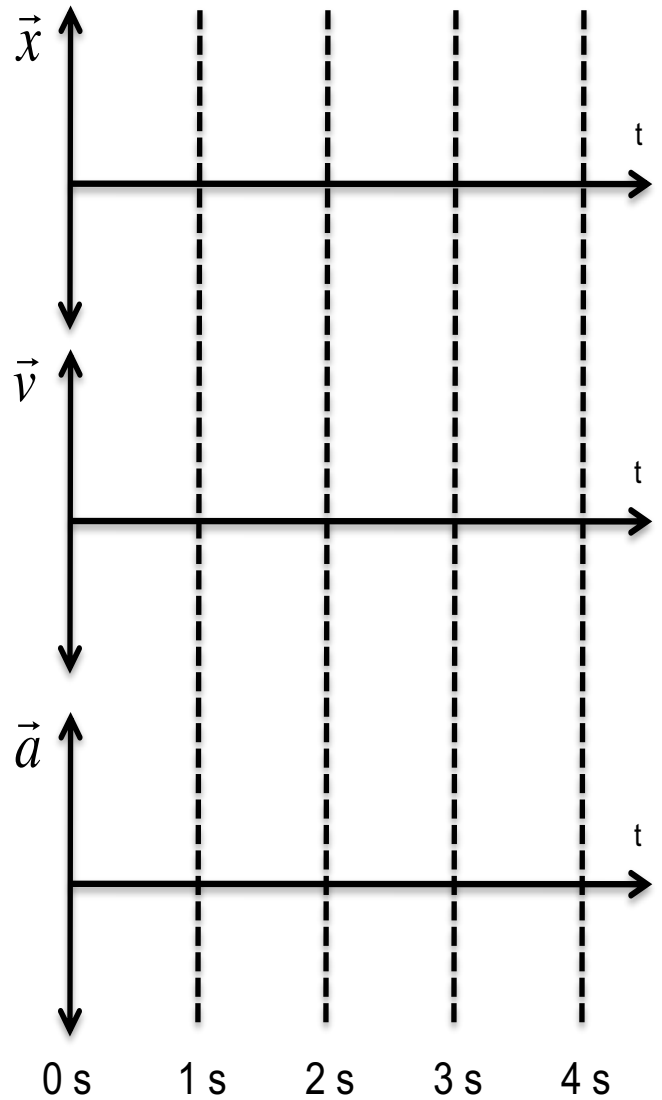


You will be graded on your communication of physics understanding.

#1 Your friend has a mass of 50 kg and is standing on a scale inside a 1000 kg elevator.

At a height of 5 m ($t = 0$) she notices that she's moving upwards with constant speed 8 m/s. She continues at this speed for 1 second and then comes to rest at a rate of 4 m/s^2 . Please make the graphs describing her motion. Label the axes to make the values explicitly clear and show her final height if you can. The horizontal axes do not have to indicate $y = 0$.



#2 In the problem above what does the scale your friend is standing on read at $t = 0.5\text{s}$, and at $t = 2\text{s}$. Remember to show your work and thought process completely. Think of convincing someone who is skeptical. *Please reflect on your answer and explain why you think it is correct, or why it might not be correct.*

#3 Jane (50 kg) is glad to see Tarzan (100 kg) and is running toward him at 5 m/s to give him a big hug. He is standing in a tree 5 m above the ground and swings down in the opposite direction to hug her. **Ka-smack!** They hit each other just as Tarzan reaches the ground, and they swing off together.

- a) Please *explain* exactly how you would calculate the final speed of these two people holding the vine (and each other).
- b) Please also set up the equations.
- c) If you are able, please find their final speed indicating direction.

#4 Your friend is on a sled (combined mass: 100 kg) moving at a speed of 4 m/s on flat, smooth snow. To speed him up, you push him forward with a force of 200 N over 8 m. After I'm done pushing my friend, he runs into a spring that compresses 50 cm before bringing him to rest.

- a) Please find the spring constant of the spring.
- b) Explain where on this ride my friend has his greatest acceleration. Calculate that acceleration if you can.
- c) Then you realize that there is a rough spot of snow for the last 4 m that has a coefficient of friction of 0.1. How would this change your approach to calculate the spring constant, and would this consideration result in the spring constant calculated in a) being higher or lower... explain.

Name _____