Calculus Grapher for Physics

Learning Goals: Students will be able to:

- Use the language of calculus to discuss motion
- Given a function sketch the derivative, or integral curves

Open ***Calculus Grapher and Moving Man before starting presentation***

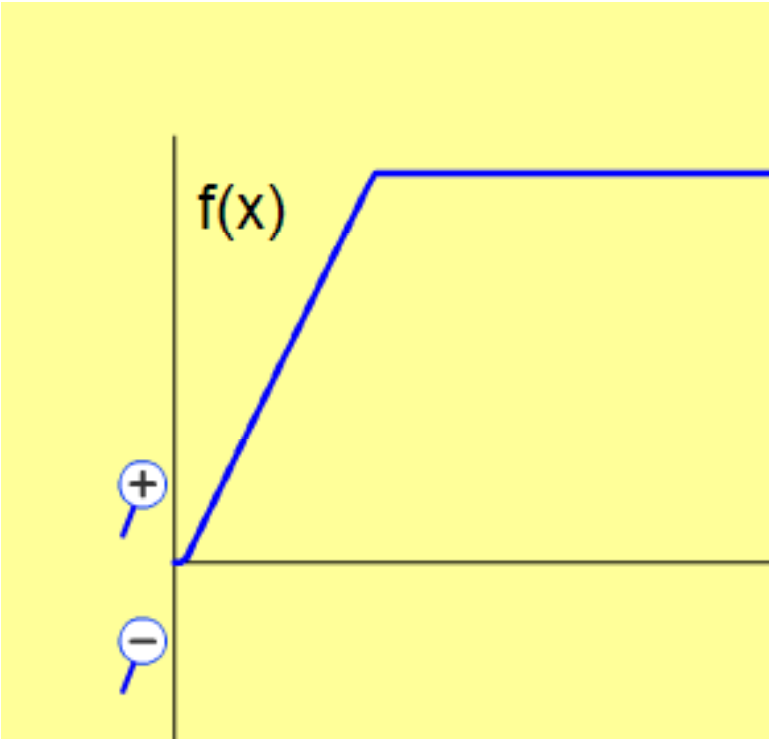
Trish Loeblein July 2009 to see course syllabi :
http://jeffcoweb.jeffco.k12.co.us/high/evergreen/science/loeblein/phys_syl/syllabus_p.html

1. A car started from a stoplight, then sped up to a constant speed. This function graph describes his..

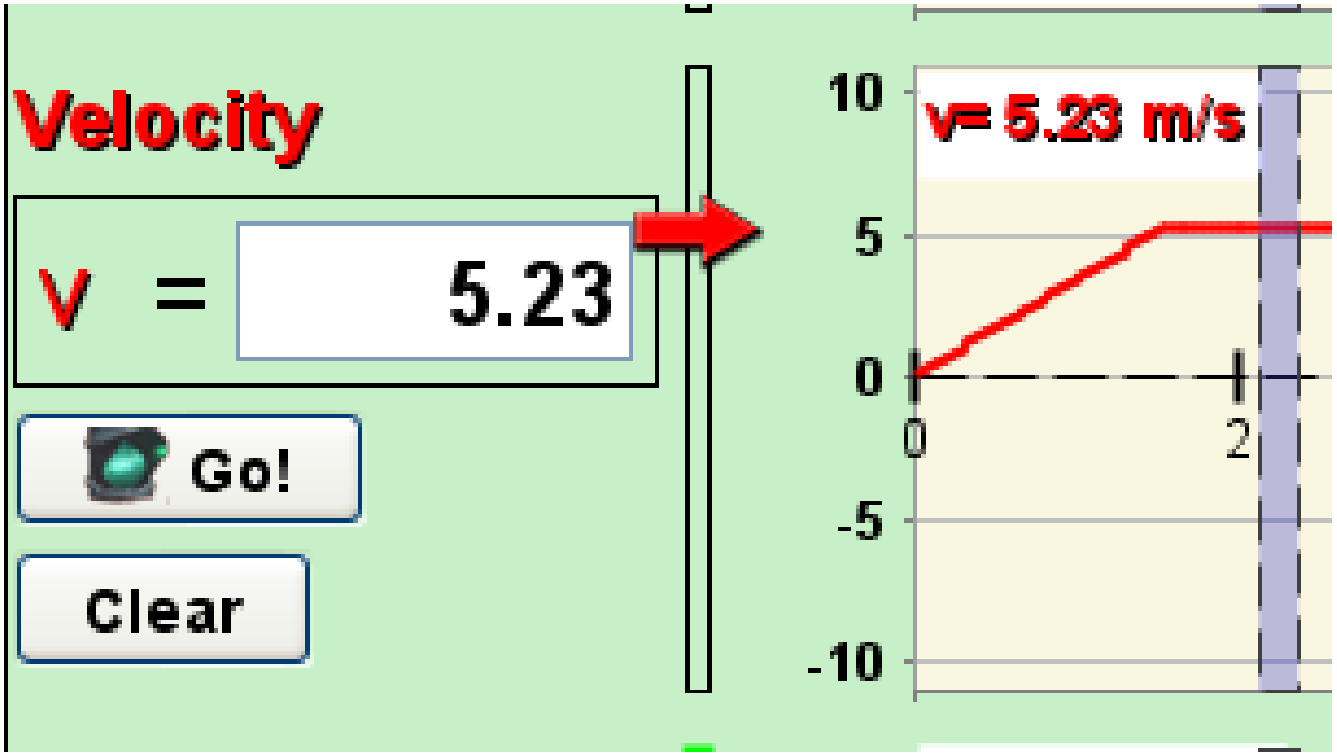
A. Position

B. Velocity

C. Acceleration



Use Moving man to show this: I set the acceleration at about 3 then paused the sim by the time the man got to the 4 spot, then I changed the acceleration to 0. If you have Moving man open with this type of scenario, you can use the grey bar to show that the speed was zero increasing and then constant.

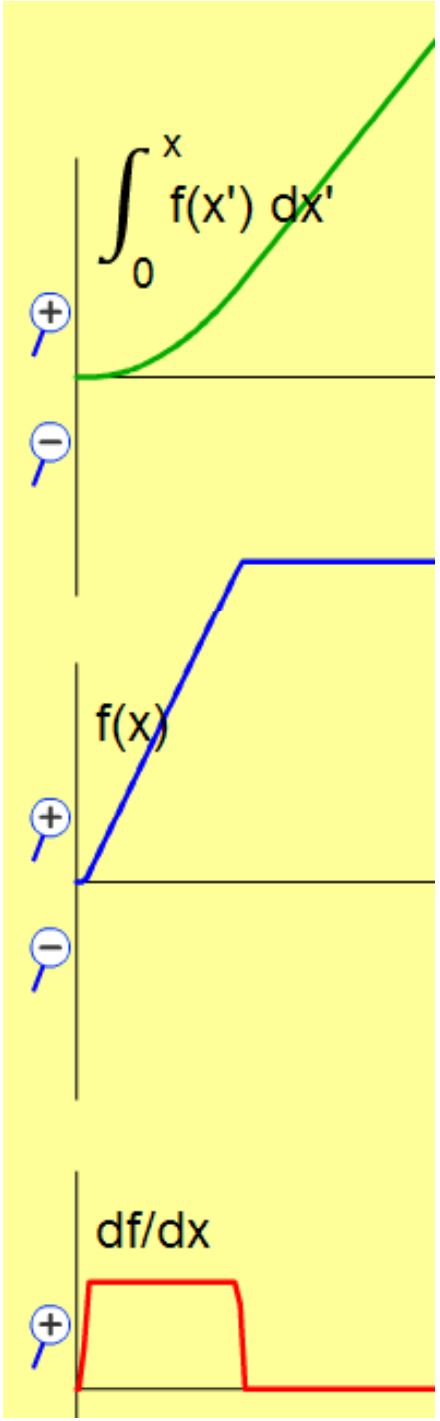


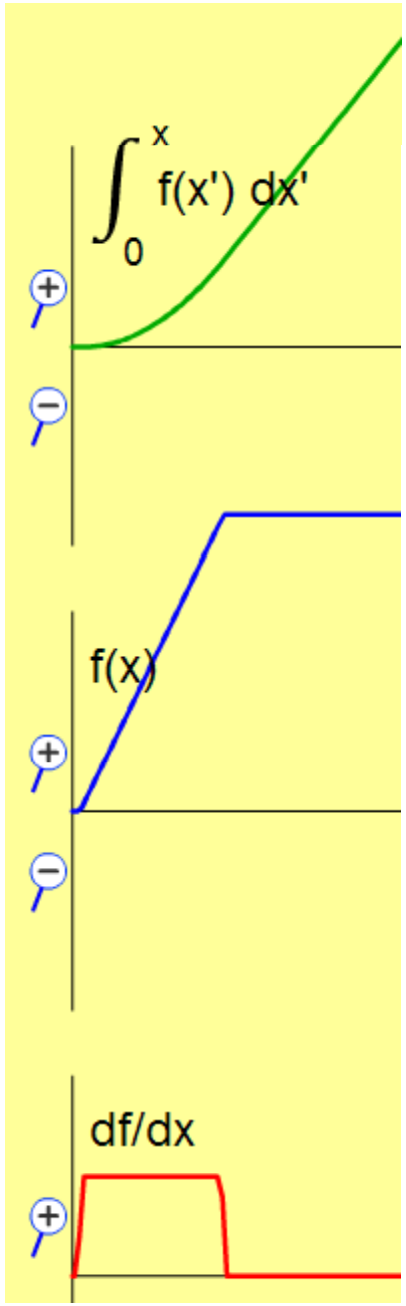
2. To find out how far he traveled, you would use

A. Integral

B. Function

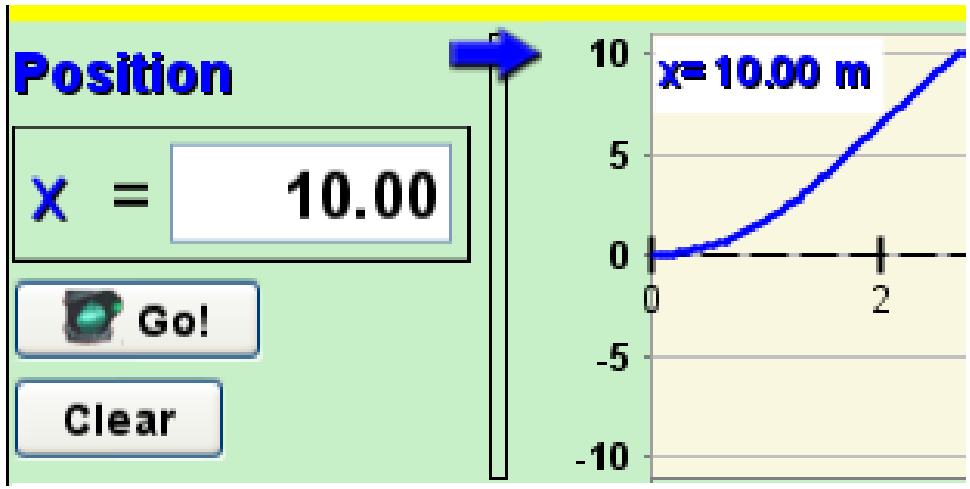
C. Derivative



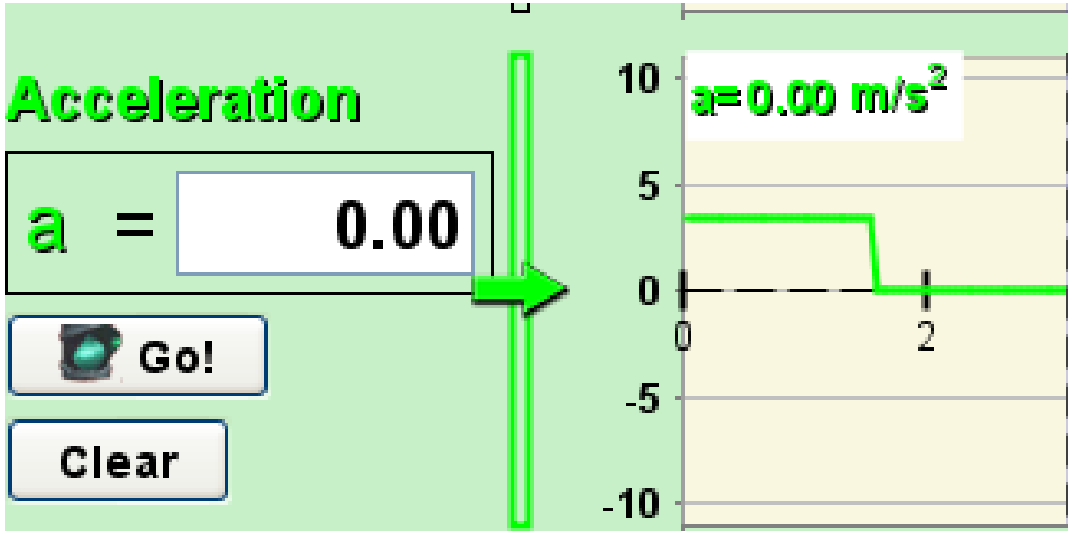


Use Moving Man **Replay** to show

Position is found by the integral curve

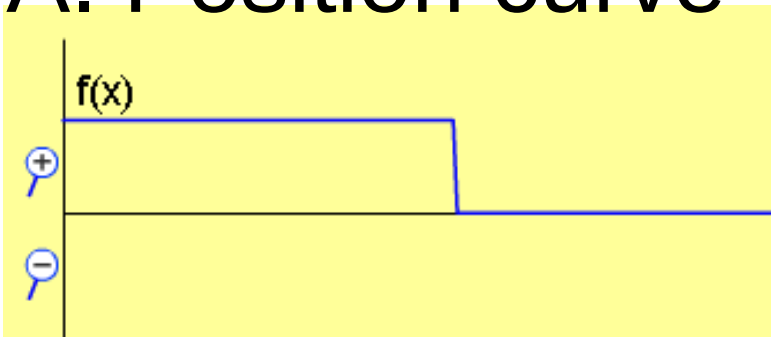


Derivative curve shows acceleration

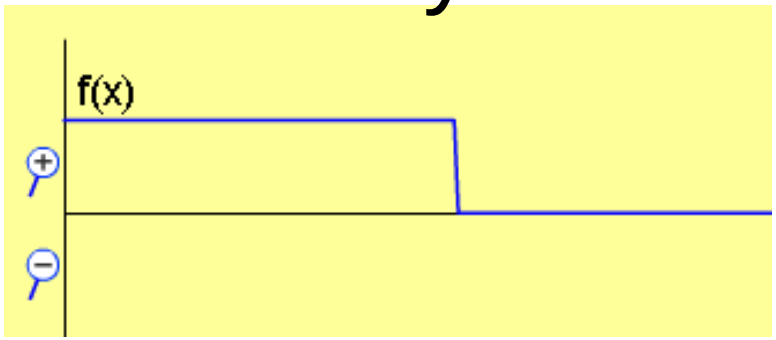


3. Your friend walks forward at a constant speed and then stops. Which graph matches her motion?

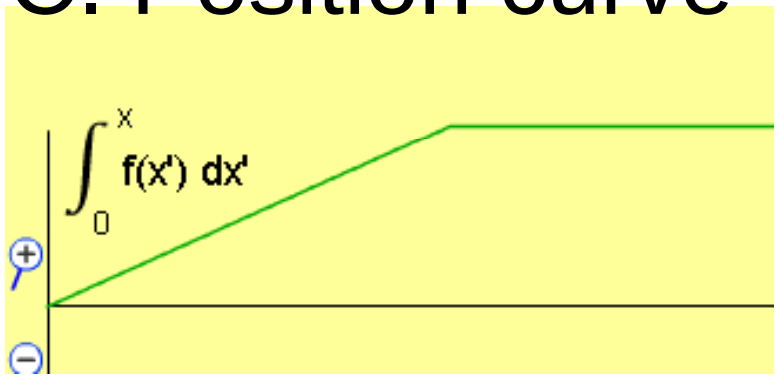
A. Position curve



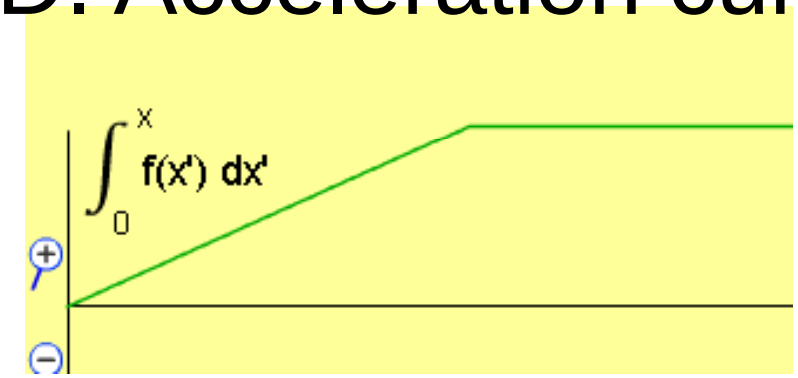
B. Velocity curve



C. Position curve

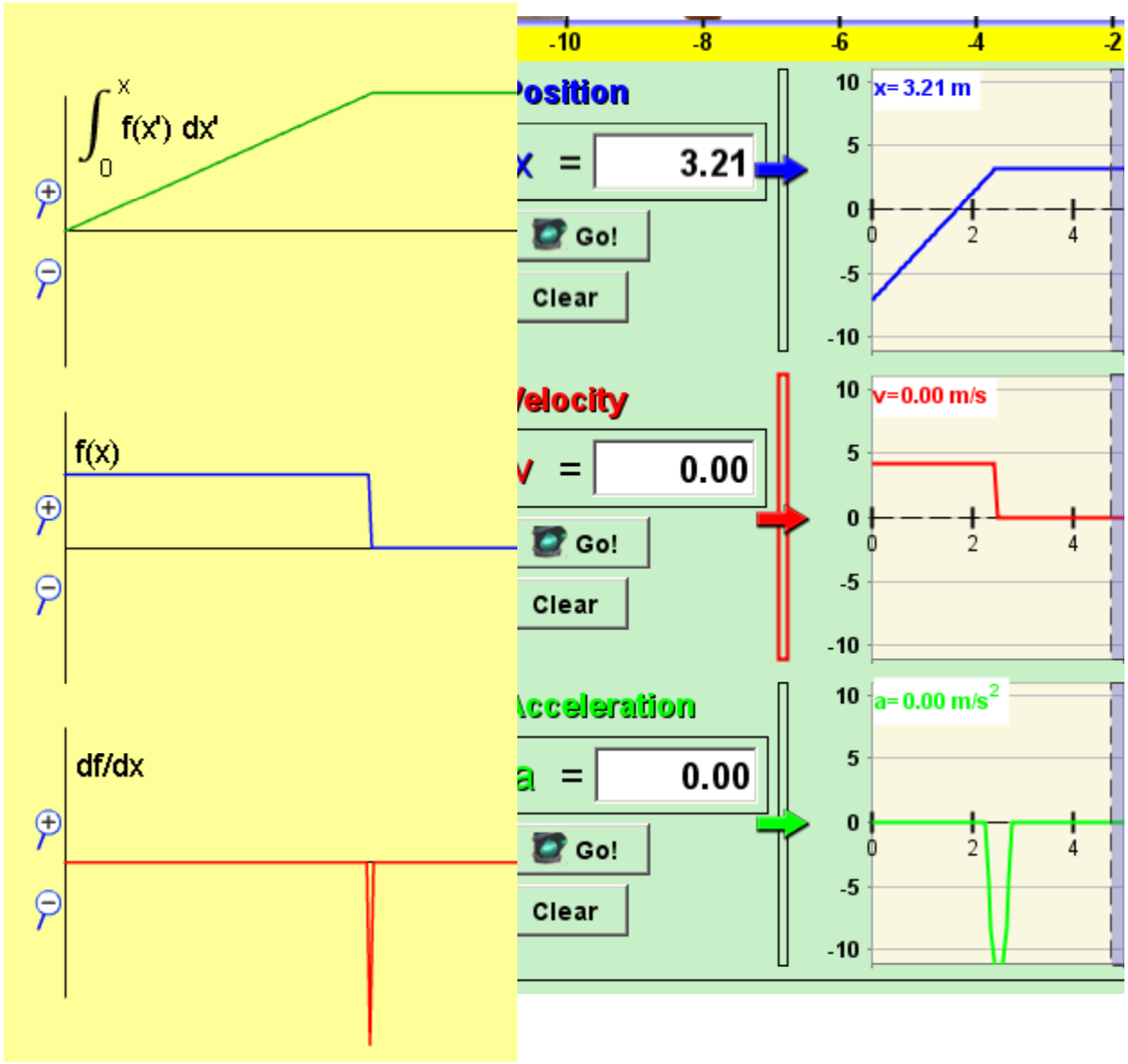


D. Acceleration curve



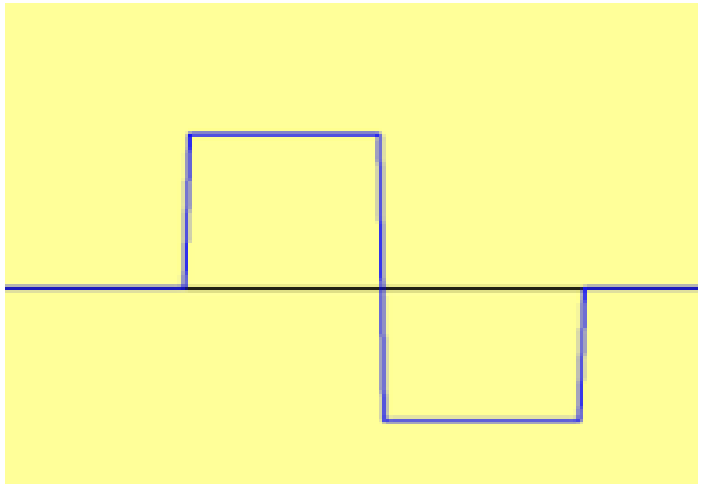
E. More than one of these

Use Moving man to show this: I set the Man at about -6 position, made the velocity about 4, then paused the sim by the time the man got to the 4 spot, then I changed the velocity to 0. If you have Moving man open with this type of scenario, you can use the grey bar to help.

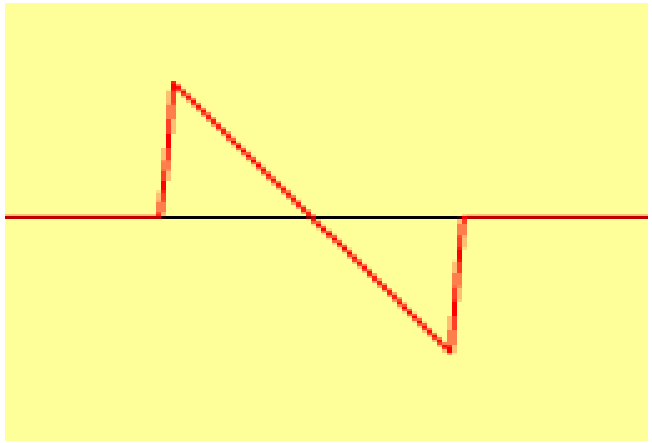


4. Which could be the derivative curve?

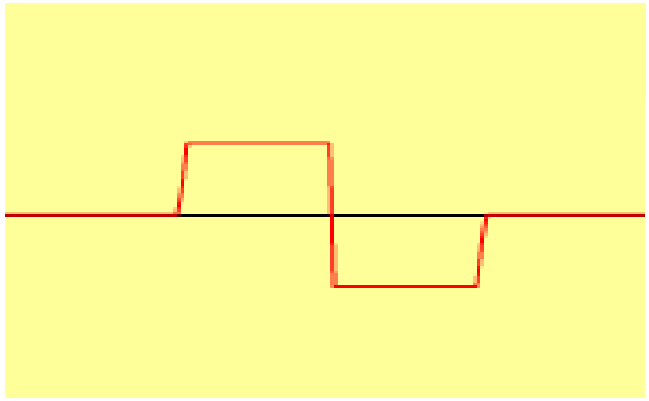
F(x)



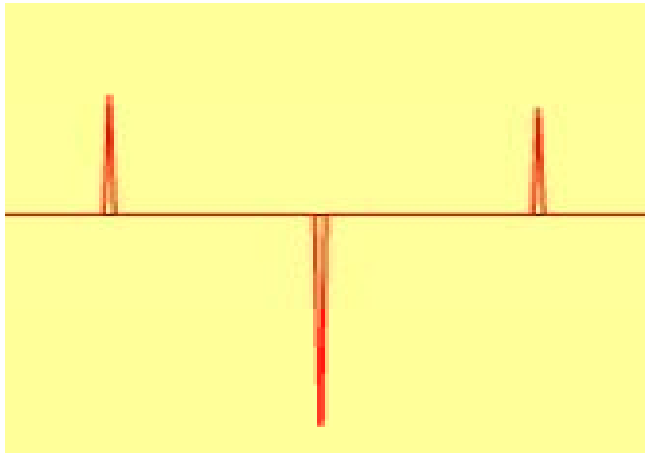
A



B



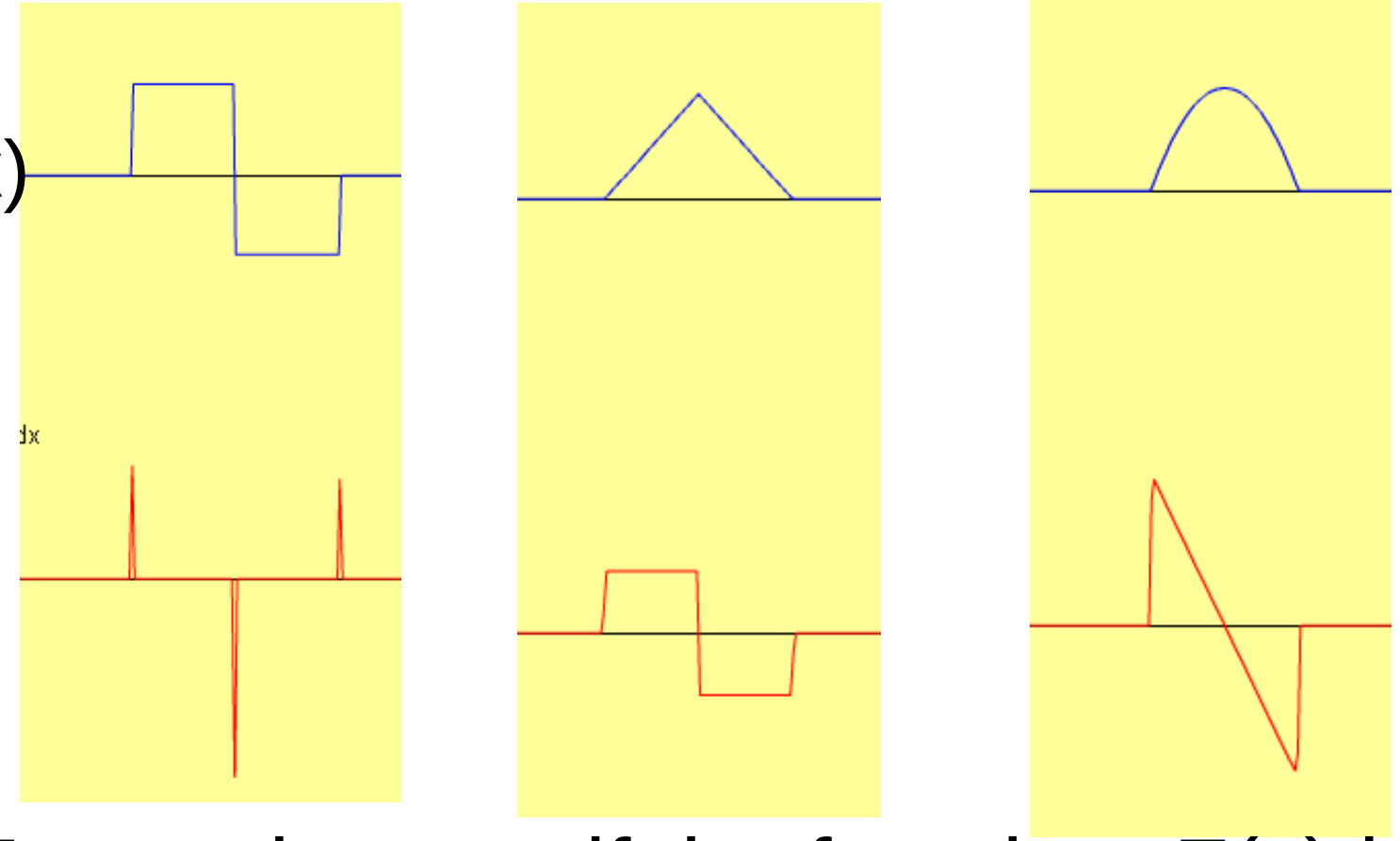
C



Pedestal Linear Parabola

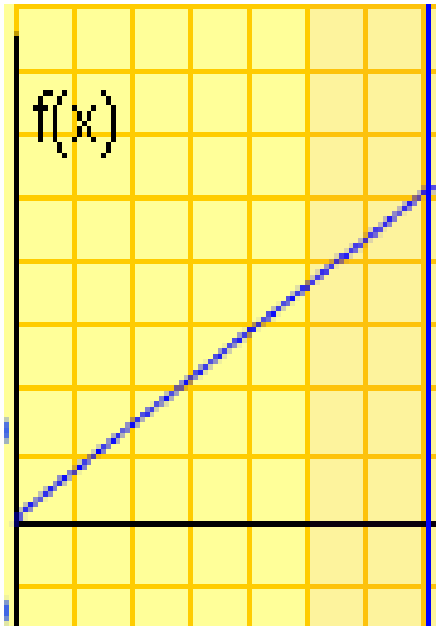
F(x)

$\frac{df}{dx}$

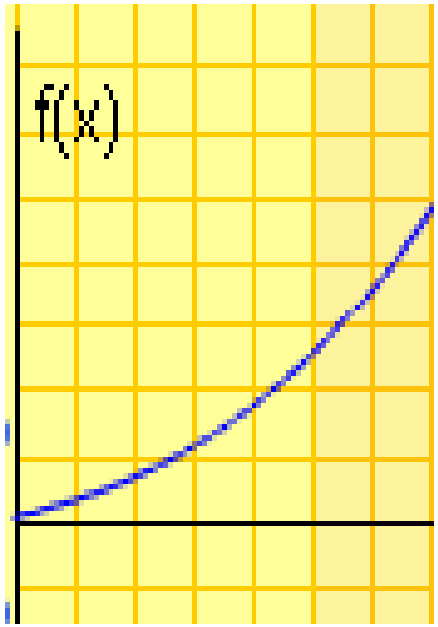


For each case, if the function, F(x) is velocity, what could a possible story for the motion of a person walking?

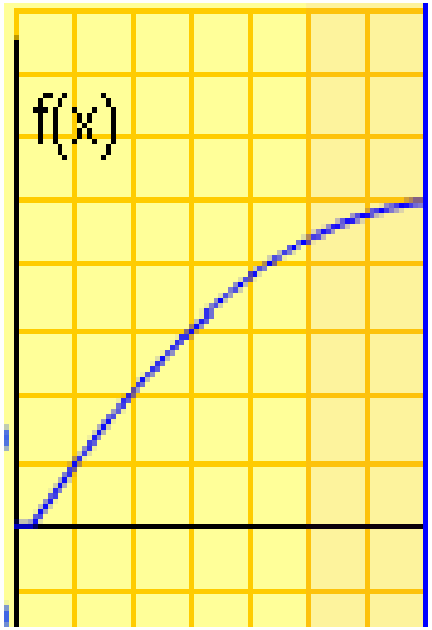
5. Three race cars have these velocity graphs. Which one probably wins?



A



B



C

D No way to tell

Max value

Use integral to tell that the parabolic one traveled

farthest