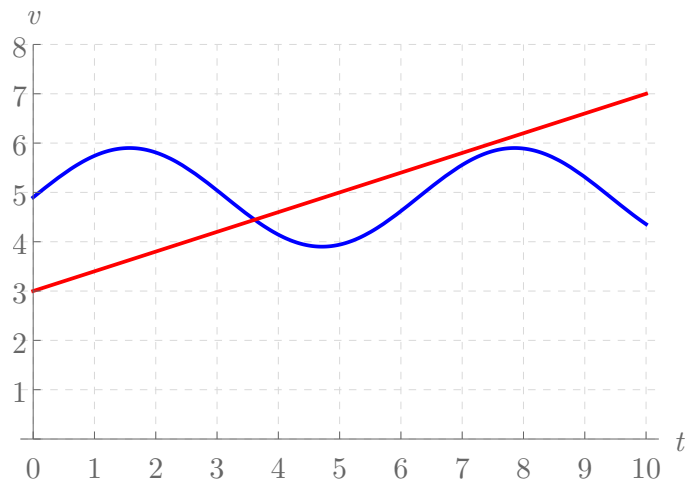


Pang and Jaelyn are having a race – they want to see who can run the farthest in 10 seconds. They start at the same spot, so say  $s(0) = 0$  for both. Pang’s velocity in meters per second is given by  $v_P(t) = 4.9 + \sin(t)$ , and Jaelyn’s velocity is given by  $v_J(t) = 3 + 0.4t$ .



1. In the plot, identify which velocity is which and label each curve with either  $v_P(t)$  or  $v_J(t)$ .
2. Who starts off faster, Pang or Jaelyn? Who is running faster at  $t = 10$  seconds?
3. What is happening at time  $t \approx 3.6$  seconds where the two curves intersect?
4. Based on the velocity graphs only, who do you think wins the race? Why? *(You don't need to be correct here, but you should provide some justification of your thinking.)*
5. Use antiderivatives to find the two position functions  $s_P(t)$  and  $s_J(t)$ . Be sure to include “+  $C$ ” in the first step and then use  $s(0) = 0$  to find the constants.

6. Use Desmos to generate graphs (in one set of axes) of  $s_P(t)$  and  $s_J(t)$  for  $0 \leq t \leq 10$ . Re-sketch below.
7. Calculate exactly where Pang and Jaelyn end up after 10 seconds. Who wins the race?
8. Fill in the following grid to show where in the interval  $(0, 10)$  seconds each position function is increasing/decreasing and concave up/down. Answer with open intervals. *(Recall that all this information can be determined from the derivative functions.)*

	Pang's position function	Jaelyn's position function
Increasing		
Decreasing		
Concave up		
Concave down		

9. What is each person's acceleration? What are the units of acceleration here?