Answer on Question #76669, Math / Calculus

A jogger runs from her home to a point A, which is 6 km away. For there 6 km, she begins by running at a constant speed till she reaches a hilly portion 2 km from her home. Here her speed slows down while she runs up the hill, which is a 1-km run. Then she speeds up while running down the hill. The last 2 km of the run are again at constant speed. Draw a graph to show the jogger's speed as a function of the distance from her home. Also find the range of this function.

Solution

Divide the distance into 4 subintervals:

$[0, 2] - interval, where\ V = V_1 = const.$

$[2, 3] - interval, where\ V\ decreases\ from\ V_1\ to\ V_{min}.$

$[3, 4] - interval, where\ V\ increases\ from\ V_{min}\ to\ V_2.$

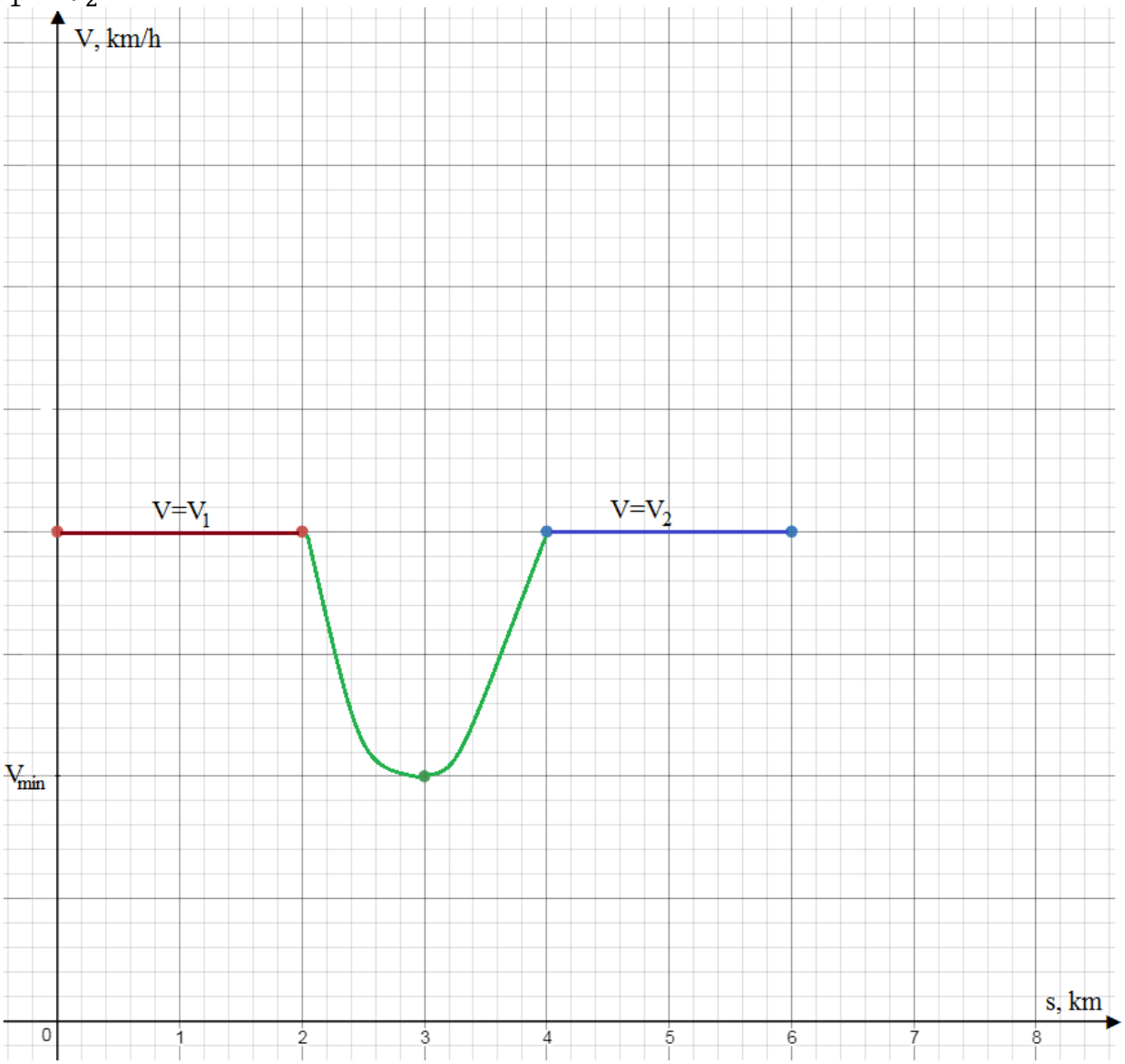
$[4, 6] - interval, where\ V = V_2 = const.$

How precisely does the velocity depend on the distance on the intervals $[2, 3]$ and$[3, 4]$?

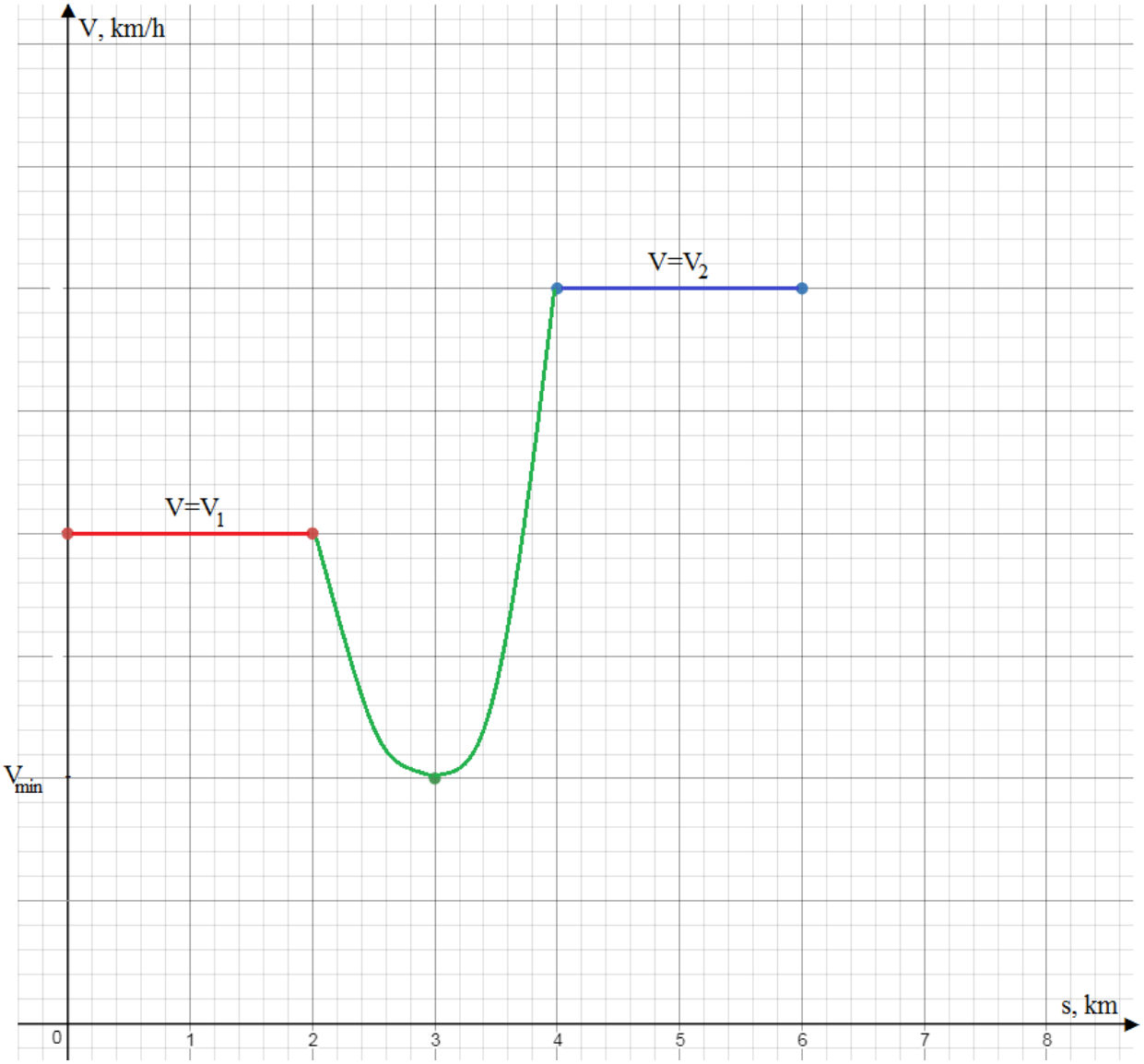
Is V_1 equal to V_2, greater thenV_2 or less thanV_2?

It is undefined.

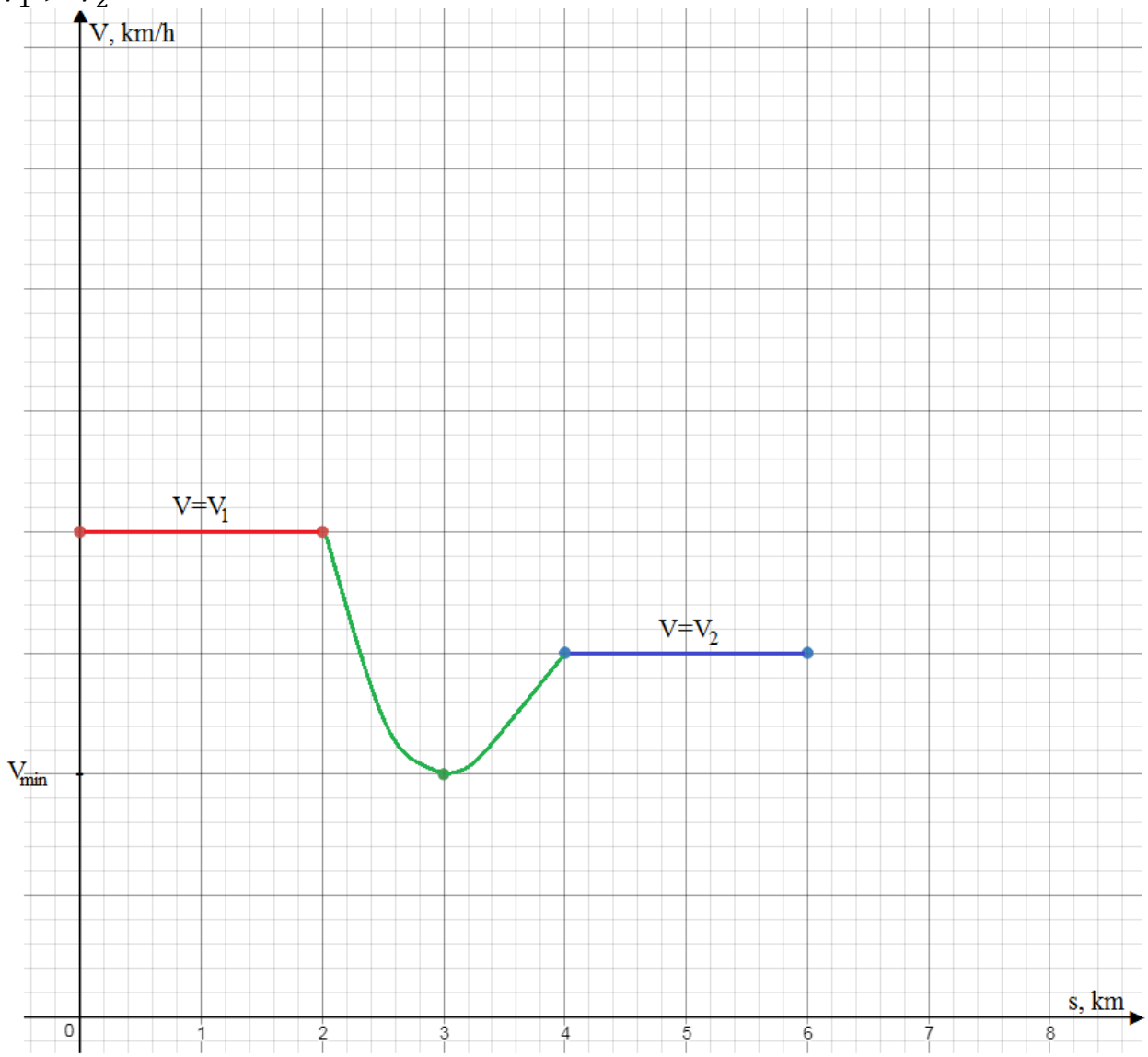
$V_1 = V_2$



$V_1 < V_2$



$V_1 > V_2$



The function $V(s)$ is constant on $(0, 2)$, decreases on $(2, 3)$, increases on (3, 4), and is constant on $(4, 6)$.

$Range: [V_{min}, max(V_1, V_2)]$