

# Integration - Absolute Value Functions

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## Question 1

Qualification: AP Calculus AB

Areas: Applications of Integration, Applications of Differentiation, Integration

Subtopics: Kinematics (Displacement, Velocity, and Acceleration), Total Amount, Increasing/Decreasing, Integration of Absolute Value Functions, Integration Technique – Exponentials, Differentiation Technique – Exponentials

Paper: Part B-Non-Calc / Series: 2003-Form-B / Difficulty: Hard / Question Number: 4

4. A particle moves along the  $x$ -axis with velocity at time  $t \geq 0$  given by  $v(t) = -1 + e^{1-t}$ .
- (a) Find the acceleration of the particle at time  $t = 3$ .
  - (b) Is the speed of the particle increasing at time  $t = 3$ ? Give a reason for your answer.
  - (c) Find all values of  $t$  at which the particle changes direction. Justify your answer.
  - (d) Find the total distance traveled by the particle over the time interval  $0 \leq t \leq 3$ .

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