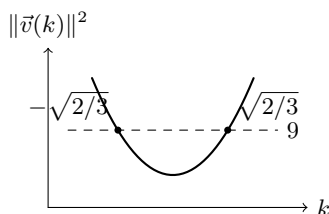


**Question 3**

Find all real  $k$  for which  $\vec{v} = \langle k, 2k - 1, k + 2 \rangle$  has magnitude 3.

### Question 3 – Solution

**Strategy** Identify the initial and terminal information first. Build the vector by subtracting coordinates, then use the magnitude formula or normalize only after the components are correct.



**Step 1** Square the magnitude equation:  $k^2 + (2k - 1)^2 + (k + 2)^2 = 9$ .

**Step 2** Expanding gives  $6k^2 + 5 = 9$ , so  $3k^2 = 2$ .

**Step 3** Therefore  $\boxed{k = \pm\sqrt{2/3}}$ ; substitution verifies both values.

**Verification** The result follows from the defining vector formulas used above, and each component, magnitude, or scalar condition has been checked against the information in the question.

**Key idea** A vector separates two ideas: its components describe displacement, while its magnitude and unit vector describe size and direction. Always check signs and confirm that a unit vector has magnitude 1.