1. $r(t) = \sin t\, i + \cos t\, j + t k$

$r'(t) = \cos t\, i - \sin t\, j + k$

$r''(t) = -\sin t\, i - \cos t\, j$

$\| r'(t) \| = \sqrt{(\cos(t))^2 + (-\sin(t))^2 + 1^2} = \sqrt{2}$

$r'(t) \times r''(t) = (\cos(t),\, -\sin(t),\, -1)$

$\| r'(t) \times r''(t) \| = \sqrt{(\cos t)^2 + (-\sin t)^2 + (-1)^2} = \sqrt{2}$

$k = \dfrac{\| r'(t) \times r''(t) \|}{\| r'(t) \|^3} = \dfrac{\sqrt{2}}{(\sqrt{2})^3} = \dfrac{1}{2}$

2. $r(t) = t\, i + t^2 j + 5 k$

$v(t) = r'(t) = i + 2t j + 0 k = i + 2t j$

$a(t) = v'(t) = 2 j$