(1) Find parametric equations for the straight line that contains the points \((1, 5, 2)\) and \((5, 0, -1)\).

One possible parallel vector is \(\vec{a} = (1 - 5)\vec{i} + (5 - 0)\vec{j} + (2 - (-1))\vec{k} = -4\vec{i} + 5\vec{j} + 3\vec{k}\). So a parameterization using \(\vec{a}\) and the first given point is: 
\[
\begin{align*}
  x &= 1 - 4t, \\
  y &= 5 + 5t, \\
  z &= 2 + 3t.
\end{align*}
\]

(2) The position vector for a particle is given by \(\vec{r}(t) = (t - 1)^2\vec{i} + 2t^2\vec{j} + t^3\vec{k}\), where time units are seconds and space units are centimeters. Find the speed of the particle when \(t = 2\). Does the particle ever stop? (Explain.)

The velocity vector is \(\vec{r}'(t) = 2(t - 1)\vec{i} + 4t\vec{j} + 3t^2\vec{k}\), so the speed at time \(t = 2\) seconds is \(\|\vec{r}'(2)\| = \|2\vec{i} + 8\vec{j} + 12\vec{k}\| = \sqrt{212}\) cm/sec. The particle never stops: the only time the first component of the velocity is zero is \(t = 1\); but then the other two components are nonzero.