**Worksheet #19**

(1) Evaluate the limit.
$$\lim_{t \to 2} \left( \frac{t^2 - 2t}{t - 2} \mathbf{i} + \sqrt{t + 4} \mathbf{j} + \frac{\sin(\pi t)}{\ln(t - 1)} \mathbf{k} \right)$$

(2) Sketch the curve $\mathbf{r}(t) = \langle t^2, \sqrt{t}, 1 \rangle$. Use arrows to indicate the direction in which $t$ increases.

(3) Find the unit tanget vector $\mathbf{T}(t)$ of $\mathbf{r}(t) = \langle \cos(t), -\sin(t), \sin(2t) \rangle$ when $t = \pi/2$.

(4) Evaluate the integral.
$$\int_0^{\pi/2} (3 \sin^2 t \cos t \mathbf{i} + 2 \sin t \cos^2 t \mathbf{j} + 2 \sin t \cos t \mathbf{k}) dt$$