5. [14 points] A particle moves on the unit circle according to the parametric equations

$$x(t) = -\sin(bt^2) \quad , \quad y(t) = \cos(bt^2) \qquad \text{and } b > 0.$$

for $0 \leq t \leq \pi$. Make sure to show all your work.

a. [1 point] What is the starting point of the particle?

b. [2 points] In which direction (counterclockwise/clockwise) is the particle moving along the circle? Justify.

c. [5 points] Find an expression for the speed of the particle. Simplify it as much as possible.

d. [2 points] At what value of t in $[0, \pi]$ is the speed of the particle the largest?

e. [4 points] Find the equation of the tangent line to the parametric equation at $t = \sqrt{\frac{\pi}{3b}}$.