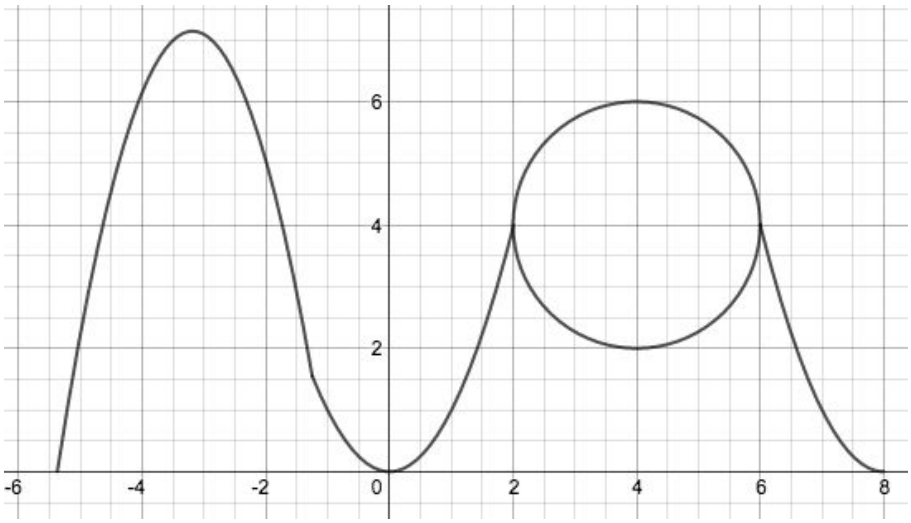
2017 HONORS PRECALCULUS CHAPTER 9 FREE-RESPONSE QUESTION

SECTION 1, PART I
A graphing calculator is allowed for these problems.



Above, you can find a portion of an image of a roller coaster. When $x \leq 2$, the roller coaster can be defined by the piecewise function, below. The loop is a circle and has a center at $(4,\ 4).$ You may assume that the radius of the circle is 2.

$$y = \begin{cases} -\frac{3}{2}x^2 - \frac{19}{2}x - 8, & -5.377 \leq x < -1.25 \\ x^2, & -1.25 \leq x < 2 \end{cases}$$

1. Write the equation of each parabola in standard form.
2. Determine the vertex, focus, p-value, length of the latus rectum, and the directrix of **each** parabola.
3. What is the coordinate at which the maximum height of the roller coaster occurs? Round to 3 decimal places.
4. On the interval $-6 < x < 2,$ what values of x does the roller coaster change directions? Does the function at these $x-$coordinates change from increasing to decreasing or decreasing to increasing?
5. Write the standard form of the equation of the loop.