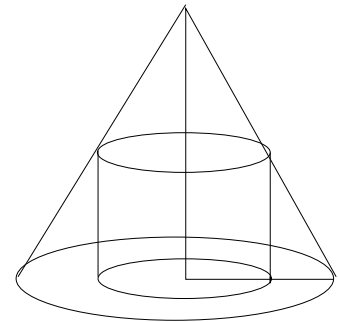


Problem 1: (8 points) The height of a right circular cone is 4 cm and its radius is 2cm. Find the dimension of the right circular cylinder with maximum volume which can to be inscribed in the cone.



Problem 2: (17 points) Consider the function $y = f(x) = \frac{x^2 - 2x + 4}{x - 2}$ with $f'(x) = \frac{x(x - 4)}{(x - 2)^2}$ and

$$f''(x) = \frac{8}{(x - 2)^3}. \text{ Find}$$

1. The asymptotes (If any exists).
2. Critical values and critical points.
3. Intervals on which the function is increasing and those on which it is decreasing.
4. Relative extrema (using the First Derivative Test).
5. Intervals on which the graph is concave up and those on which it is concave down.

6. Inflection points.

7. Use the Second Derivative Test to check the relative extrema of the function.

8. Sketch the graph of the function. Clearly indicate the critical numbers, extrema and inflection points.

