Question:

It is true that $Q(x) = x^5 + x^3 + x$ is a one-to-one function whose domain and range are all numbers.

a) Graph $Q(x)$ on the interval $-2 \leq x \leq 2$.

b) Suppose that R is the function inverse to Q. There is no simple algebraic way to compute values of R. Compute $R(3)$, $R'(3)$ and $R''(3)$.

Hint $Q(R(x)) = x$ and $R(Q(x)) = x$. So find an input to Q which will "output" 3. Then differentiate one of the equations, maybe more than once.

Question:

A cylinder vase having an ellipse base is placed in front of a wall as shown in the figure. Assume that x-axis represents the wall and the equation of the ellipse is given by $\frac{(x-2)^2}{4} + (y-2)^2 = 1$. If a candle is placed at point $(2, 4)$, what will be the length of the shadow on the wall?

Hint: Find the equations of the lines which are tangent to the ellipse and passing through $(2, 4)$.