Nicely show all your work on this page. No books, notes, calculators!

1. Let $f(x) = \frac{x^2 - 16}{2x - 2}$. Is $f$ symmetric? Find the domain of $f$, the $x$ and $y$ intercepts, the asymptotes, the intervals where $f$ is increasing, decreasing, concave upwards, and concave downwards, respectively, the local extrema, the inflection points, and sketch the graph of $f$.

2. Party. You are at the point $(0, 1)$, the bar is the interval $[0, 1]$ on the $x$-axis. Suddenly you see your neighbor who is standing at $(1, 2)$. You want to go to talk to him, but first go to the point $(p, 0)$ at the bar and grab a drink (i.e., go straight from $(0, 1)$ to $(p, 0)$ and then straight from $(p, 0)$ to $(1, 2)$). Draw a picture of the scene and describe the travel distance as a function of $p$. How long is the minimal (in case your neighbor is a good friend) and the maximal (in case your neighbor isn’t such a good friend) travel distance?

3. Graph the function $f(x) = x^2 + 2x + 1$. Use Newton’s method with $x_0 = 0$ to calculate (and plot) $x_1$, $x_2$, $x_3$, $x_4$. Give a formula for $x_n$. What is the limit of $x_n$ as $n \to \infty$?