## MCS 119

## Graphing and Max/Min Problems with Trig Functions

1. Carefully graph the function $f(x)=x+2 \cos (x)$. Clearly indicate the $x$ and $y$ intercepts, the local extrema, the inflection points, where the graph is increasing or decreasing, and where the graph is concave up or concave down.
2. Find the maximum and minimum values of $f(x)=e^{x} \sin (x)$ on the interval $[0,2 \pi]$.
3. Find the maximum and minimum values of $g(x)=\cos (x)+\sqrt{3} \sin (x)$ on the interval $(-\infty, \infty)$.
4. A sewage gutter is to be constructed from a piece of sheet metal 8 feet long and 4 feet wide by folding up a 1 foot strip on each side. Suppose $\theta$ is the angle between the side and the vertical, as shown in the picture below. What should $\theta$ be in order to have a sewage gutter of maximum volume?
