1. Find the absolute maximums and minimums of \( f(x) = x^3 - 3x + 1 \) on the interval \([0, 3]\). I must see all of the supporting work. Answers that have been clearly taken from the maximum and minimum functions of the graphing calculator will receive no credit.

**Solution:** First find the critical numbers to the function. These are where the derivative is either zero or is undefined.

\[
f'(x) = 3x^2 - 3
\]

and \( 3x^2 - 3 = 0 \) when either \( x = 1 \) or \( x = -1 \). Since we are interested in just the interval \([0, 3]\) we only consider \( x = 1 \) as a critical number. Furthermore, since \( f'(x) = 3x^2 - 3 \) is a polynomial we know that it is defined everywhere and hence do not need to check that case. To finish it up we just need to evaluate the original function at 0, 1, and 3.

\[
\begin{align*}
f(0) &= 1 \\
f(1) &= -1 \\
f(3) &= 19
\end{align*}
\]

So we have a maximum of 19 at \( x = 3 \) and a minimum of \(-1\) at \( x = 1 \).