Using the graphing calculator to estimate solutions of certain types of equations, or to estimate maxima or minima

see Example 4.8 (and also Examples 4.6 and 4.9)
We consider the function $y = x^4 - x^3 - 4x^2 + 4x$ Using **zero**: we will estimate the solutions of $x^4 - x^3 - 4x^2 + 4x = 0$, which are also the x-intercepts of the function above.

1. This method is used to solve when one side of the equation is 0. Enter the other side of the equation in Y=
2. Graph and note how many zeroes there appear to be. Choose one to work on first.
3. 2nd → CALC (over TRACE) → 2:zero
4. Left bound? (This will be a lower bound for the correct value of x) Move the cursor if necessary, using the left-right arrows, to a point which is "before" (to the left of) the zero you want to find, but fairly close to it. Then ENTER.
5. Right bound? (This will be an upper bound for the correct value of x) Move the cursor using the right arrow to a point which is "after" (to the right of) the zero you want to find. The best thing is to have the graph strictly increasing or strictly decreasing between your two bounds. Then ENTER.
6. Guess? Move the cursor using the right-left arrows until it is very close to the zero you are trying to find. Then ENTER.
7. Read off your zero. Round as necessary.
8. Repeat steps 3-7 for any other zeroes.

Using **maximum or minimum**: we will estimate the local maxima or minima of the function above.

1. Enter the function in Y=
2. Graph and note the positions of any local maxima ("tops of hills") or minima ("bottom of valleys)". Choose one to work on first.
3. 2nd → CALC (over TRACE) → 3:maximum, or 4:minimum, depending on which it is.
4. Left bound? (This will be a lower bound for the correct value of x) Move the cursor if necessary, using the left-right arrows, to a point which is "before" (to the left of) the point you want to find, but fairly close to it. Then ENTER.
5. Right bound? (This will be an upper bound for the correct value of x) Move the cursor using the right arrow to a point which is "after" (to the right of) the point you want to find. The best thing is to have the graph strictly increasing or strictly decreasing between your two bounds. Then ENTER.
6. Guess? Move the cursor using the right-left arrows until it is very close to the point you are trying to find. Then ENTER.
7. Read off the coordinates of the local maximum or minimum. Round as necessary.
8. Repeat steps 3-7 for any other local maxima or minima.