MAT 137
Tutorial #11– Graphing
January 7–8, 2019

Sketch the graph of the functions below. Your graph does not need to be exact, but it needs to contain all the important points and all the important characteristics. Here are various characteristics that may be worth analyzing (not all of them are relevant to all functions):

- Find the domain, and the points of intersection with the axes.
- Find the intervals where the function is increasing or decreasing. Find the critical points, and classify them as local maxima, local minima, or neither.
- Study the concavity of the function and find the inflection points.
- Study the behaviours as $x \to \infty$ and as $x \to -\infty$. Also find all the asymptotes, and the points of intersection with the asymptotes.
- Study any other important points and the behaviour near them. For example, endpoints of the domains, points of discontinuity, vertical tangent lines, corners, cusps, ...

1. $f(x) = x^3 - 3x$
2. $f(x) = x^6(x+3)^3$
3. $f(x) = \dfrac{2x^2}{x^2-1}$
4. $f(x) = x\sqrt{4-x^2}$
5. $f(x) = \dfrac{e^x}{e^x+1}$
6. $f(x) = \dfrac{\sin x}{1+2\cos x}$
7. $f(x) = \ln(1-\ln x)$

You won't have time to finish all of these during tutorial; you can continue working on them later. The best way to develop enough intuition for graphing is to solve a few of these problems.

If you need to check your answers, use `http://desmos.com`, but do not go there until you are done. If you need to see examples solved in detail, you have many in section 4.9 of the textbook.