1. Midterm 2 is in a week. On another sheet of paper, make a brief plan of how you will study for the test.
2. (Warm-up) What does the second derivative test tell us?
3. (Warm-up) If we are given the formula for a function, how do we find the inflection points?
4. Use the second derivative test to find the local extrema of $f(x)=x^{5}-2 x^{4}-15 x^{3}+20 x^{2}+44 x-48$ (do not simplify your answers).
5. Sketch the graph of a function satisfying the following conditions.
(a) $f^{\prime}(x)>0$ and $f^{\prime \prime}(x)<0$ for all $x$.
(b) $f^{\prime}(x)<0$ for $x<0$ and $f^{\prime}(x)>0$ for $x>0$, and $f^{\prime \prime}(x)<0$ for $|x|>2$ and $f^{\prime \prime}(x)>0$ for $|x|<2$.
6. For each of the following functions:
i. find the critical points;
ii. use the second derivative test (and the first derivative test, where necessary) to check whether each critical point is a local maximum or local minimum;
iii. find the inflection points;
iv. determine intervals on which the function is increasing, decreasing, concave up, and concanve down;
v. use the above information to give a sketch of the graph.
(a) $f(x)=3 x^{4}-8 x^{3}+6 x^{2}$
(b) $f(x)=\frac{1}{\cos x+1}$ on $[0,2 \pi]$
(c) $f(x)=x e^{-x^{2}}$
(d) $f(x)=\frac{1}{x}-\frac{1}{1-x}$
