Written Homework Problems §4.5

21 problems for 42 points

§4.5 # 202, 203, 204, 207, 208, 210, 213, 214, 215, 216, 217, 220, 225, 227, 234, 235, 237, 241, 243

Problem A: Let $f(x) = x^4 - 4x^3$.
(i) Use the First Derivative Test to identify any local maximums or minimums. (Note: $f'(x) = 4x^3 - 12x^2 = 4x(x-3)$.)
(ii) Use the Second Derivative Test to identify any local maximums or minimums. (Note: $f''(x) = 12x^2 - 24x = 12x(x-2)$.)
(iii) Describe the advantages and disadvantages of the two tests.
(iv) Use $f'(x)$ and $f''(x)$ to determine where $f(x)$ is increasing or decreasing, concave up or concave down. Use this information to sketch the graph.

Problem B: Let $f(x) = x^{2/3}(6-x)^{1/3}$, $f'(x) = \dfrac{4-x}{x^{1/3}(6-x)^{2/3}}$, $f''(x) = \dfrac{-8}{x^{4/3}(6-x)^{5/3}}$.
(i) Determine intervals of increase and decrease.
(ii) Identify any local extrema. (ie maxs and mins)
(iii) Determine intervals of concavity.
(iv) Determine any inflection points.
(v) Sketch $f(x)$.