Show all your work. Due April 7th, 2017.

Name:
Student ID:

1. (**Sketch the Graph of a Function**)
   Sketch a graph of the function
   $$f(x) = x^4 - 4x^3 + 10 \tag{1}$$
   using the following steps.
   (a) Analyze $f(x)$: find the domain, intercepts.
   (b) Analyze $f^{'}(x)$: find where the extrema of f occur, the intervals on which f is increasing and the intervals on which f is decreasing.
   (c) Analyze $f^{''}(x)$: find the inflection points, where the graph of f is concave up and where it is concave down.
   (d) Sketch a possible graph for f.

2. (**Sketch the Graph of a Function**)
   Following the graphing strategy as in question 1 (or in Page 311 - 312 of the textbook) and analyze the function $f(x) = 2x/(1-x)$. State all the pertinent information and sketch the graph of f.

3. (**L'Hopital's Rule**) Evaluate the following limits:
   (a) $\lim_{x\to 0} \frac{\sqrt{1+x}-1}{x}$,
   (b) $\lim_{x\to 4} \frac{e^x-e^4}{x-4}$,
   (c) $\lim_{x\to 1} \frac{\ln x}{(x-1)^3}$,
   (d) $\lim_{x\to 0} \frac{e^{2x}-1-2x}{x^2}$,
   (e) $\lim_{x\to \infty} \frac{\ln x}{x}$.