MATH 1A MIDTERM II SAMPLE, XINYI YUAN, FALL 2014

1. Find the limit
$$\lim_{x\to 0}\frac{\ln(1+x)-x+\frac{1}{2}x^2}{\tan^3 x}.$$

2. Find the derivative of
$$f(x)=\sqrt{u^2-1}-\cos^{-1}\frac{1}{u}.$$
Simplify your answer as much as possible.

3. Assume the relation
$$\sin(x+y)+\cos(x-y)=e^{xy}.$$
Express $\dfrac{dy}{dx}$ in terms of x and y.

4. Find the maximal value and the minimal value of the function
$$f(x)=\frac{x}{x^2-x+1}$$
in the interval $[0,3]$.

5. Graph the function
$$y=xe^{\frac{1}{x}}.$$
The graph should clearly show the intercepts, the asymptotes, local extremes, concavity and inflection points. Explain how you get these properties. (Plotting will not receive full credit.)