MATH191: Practice Sheet 6

1. Find the Maclaurin series of:

$$a)\ f(x) = \sinh 2x; \qquad b)\ f(x) = \cosh x \sinh x.$$

2. Use L'Hôpital's rule to evaluate the following limits:

$$a)\ \lim_{x \to 2} \frac{x^2 + x - 6}{x - 2}; \qquad b)\ lim_{x \to 0} \frac{e^x - 1}{x}; \qquad c)\ f(x) = \lim_{x \to 0} \frac{\ln(1 + x) - x}{x^2}$$

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3. Use the definitions

$$\cosh x = \frac{e^x + e^{-x}}{2}, \quad \sinh x = \frac{e^x - e^{-x}}{2}$$

to prove the identity

$$\sinh(x - y) = \sinh(x)cosh(y) - \cosh(x)\sinh(y).$$

4. Sketch the graphs of

$$a)\ f(x) = 1 + e^{-x}; \qquad b)\ f(x) = e^{x^2/2},$$

indicating clearly any crossings of axes, and any horizontal or vertical asymptotes