Maximization and Limits at Infinity

1. Decide if the Extreme Value Theorem applies in each case. Find the global maxima and minima on the indicated domains (if they exist).

   (a) $f(x) = x^3 - 2x$ for $x \geq 0$

   (b) $g(t) = 1 - e^{-t}$ on the interval $(-\infty, \infty)$ (the whole real number line)

2. Evaluate the following limits.

   (a) $\lim_{x \to \infty} \dfrac{4 - 19x^9 + 7x^7}{14x^9 - 1}$

   (b) $\lim_{x \to -\infty} \dfrac{x^3 - 2x + 1}{x^2 - 5x}$

(c) $\lim_{x\to\infty} \dfrac{2^x - 4^x}{3^x - 5 \cdot 4^x}$

(d) $\lim_{x\to-\infty} \dfrac{2^x - 4^x}{3^x - 5 \cdot 4^x}$

(e) $\lim_{t\to\infty} \dfrac{\sqrt[3]{15x^9 - 14x}}{\sqrt[9]{x^{81} - 8x^{20}}}$