Sample Exam 3

1. Find the **absolute** extreme values of f on the given closed interval, and state where those values occur:

   (a) $f(x) = 6x^{4/3} - 3x^{1/3}$ on the interval $[-1, 1]$.

   (b) $f(x) = (x - 1)^3$ on the interval $[0, 4]$

2. For the following functions determine the: 1) domain, 2) x-intercepts, 3) interval(s) of increase/decrease, 4) relative extrema, 5) concavity, 6) inflection points, 7) asymptotes and 8) sketch the graph.

   (a) $f(x) = x^4 + 2x^3 - 1$

   (b) $f(x) = \dfrac{x + 3}{x - 2}$

3. Find the limit

   (a) $\displaystyle \lim_{x \to 0} \frac{1 - \cos(x)}{x^2}$

   (b) $\displaystyle \lim_{x \to \infty} \frac{x}{e^x}$

   (c) $\displaystyle \lim_{x \to \infty} x \cdot \sin\left(\frac{\pi}{x}\right)$

   (d) $\displaystyle \lim_{x \to 0} \csc(x) - \frac{1}{x}$

   (e) $\displaystyle \lim_{x \to \infty} \frac{3x^2 + 20x}{2x^4 + 3x^3 - 29}$

   (f) $\displaystyle \lim_{x \to \infty} \frac{e^{2x}}{x^2}$

   (g) $\displaystyle \lim_{x \to \infty} \frac{\sqrt{x^2 + 2}}{3x - 6}$