1) **Use the definition** of limits to verify the following limits.

    a) Let f be the constant function $f(x) = \pi$. Prove that $\lim\limits_{x \to 0} f(x) = \pi$.

    b) $\lim\limits_{x \to 2} x^3 = 8$.

    c) $\lim\limits_{x \to 2} \dfrac{1}{x} = \dfrac{1}{2}$

    d) $\lim\limits_{x \to 2} x^3 + \dfrac{1}{x} = \dfrac{17}{2}$ [Hint: Use a) and b)]

    e) $\lim\limits_{x \to 2} \dfrac{1}{x^2} = \dfrac{1}{4}$ [Hint:

$$\left| \frac{1}{x^2} - \frac{1}{a^2} \right| = |x - a| \left| \frac{1}{xa^2} + \frac{1}{x^2 a} \right|.$$

    f) $\lim\limits_{x \to 3} \sqrt{2x + 3} = 3$.

2) We say that $\lim\limits_{x \to a} f(x) = +\infty$ if for all $M > 0$ there is $\delta > 0$ such that $f(x) > M$ for all x with $0 < |x - a| < \delta$.

    a) Prove that $\lim\limits_{x \to 1} \dfrac{1}{(x - 1)^2} = +\infty$.

    b) Does $\lim\limits_{x \to 1} \dfrac{1}{x - 1} = +\infty$?

    c) Suppose $\lim\limits_{x \to a} g(x) = 0$, $N > 0$ and $f(x) > N$ for all x. Prove that
$\lim\limits_{x \to a} \dfrac{f(x)}{|g(x)|} = +\infty$.