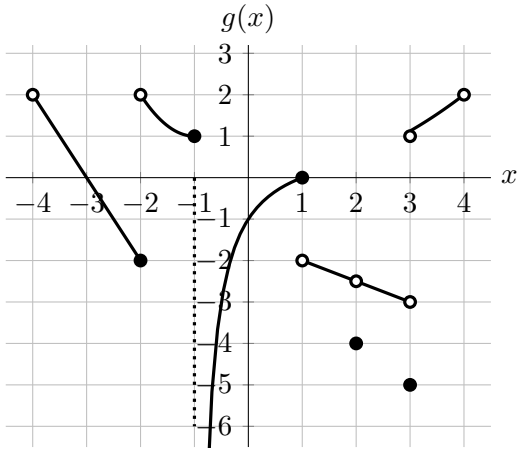
8. [15 points] Consider the functions $f(x)$ and $g(x)$ given by the formula and graph below.

$$f(x) = \begin{cases} 2x^3 - 2x^2 & \text{for } x \le 1, \\ x^3 + 1 & \text{for } x > 1. \end{cases}$$



a. [5 points] Circle the correct answer(s) in each of the following questions.

i) At which of the following values of x is the function $g(x)$ not continuous?

$x = -3$ $\quad$ $x = -1$ $\quad$ $x = 0$ $\quad$ $x = 2$ $\quad$ $x = 3.5$

ii) At which of the following values of x is the function $f(x) + g(x)$ continuous?

$x = -2$ $\quad$ $x = -1$ $\quad$ $x = 0$ $\quad$ $x = 1$ $\quad$ $x = 2$

Note that $g(x)$ is linear on the interval $(-4, -2)$, $(1, 2)$ and $(2, 3)$. All your answers below should be *exact*. If any of the quantities do not exist, write DNE.

b. [2 points] Find $\lim_{x \to 2} (2f(x) + g(x))$.

Answer: _____

c. [2 points] Find $\lim_{x \to \infty} \dfrac{f(2x)}{x^3}$.

Answer: _____

d. [2 points] Find $\lim_{x \to \infty} g\left(x^2 e^{-x} + 3\right)$.

Answer: _____

e. [2 points] For which value(s) of p does $\lim_{x \to p^+} g(x) = 1$?

Answer: _____

f. [2 points] Find $\lim_{x \to -1^-} f(-x)$.

Answer: _____

