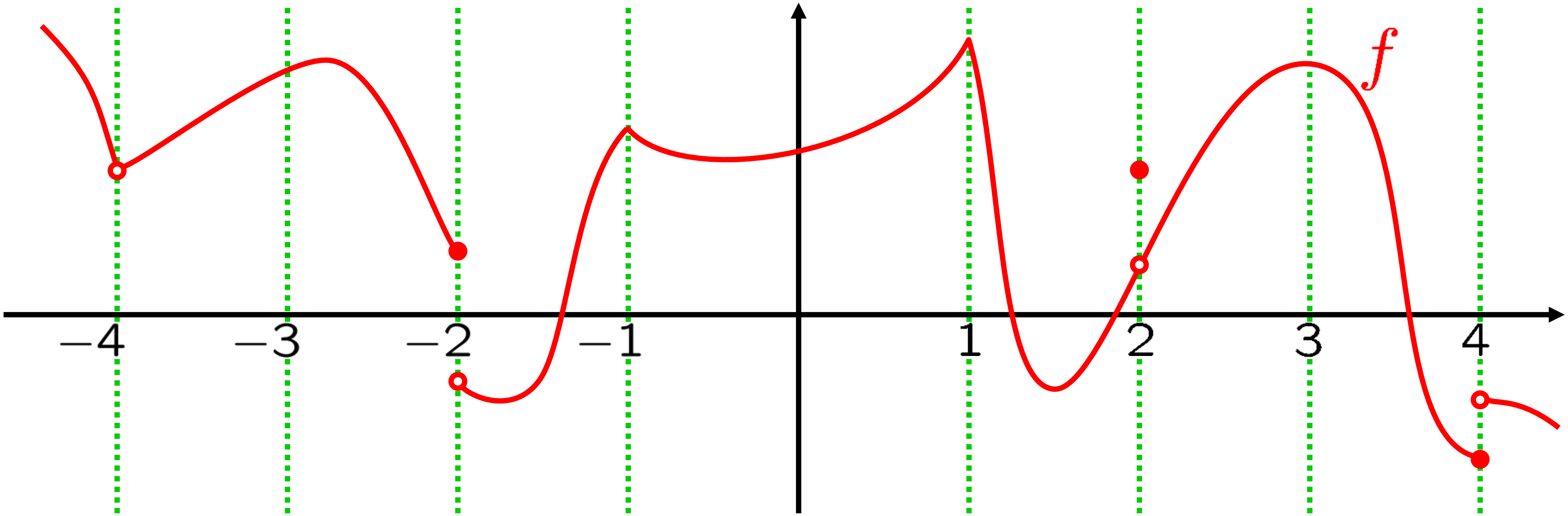
CALCULUS

Continuity

OLD2



0210-1. a. At which numbers is the function f, shown above, discontinuous?

OLD2

b. For each of the numbers, given in Part a, where f is discontinuous, state whether or not f is continuous from the LEFT at that number.

c. For each of the numbers, given in Part a, where f is discontinuous, state whether or not f is continuous from the RIGHT at that number.

0210-2. Display the graph of a function f
OLD2

s.t. $$\lim_{x\to -1^-} f(x) = -3, \qquad \lim_{x\to -1^+} f(x) = 1,$$

and s.t. $$f(-1) = 1,$$

and s.t. $$\lim_{x\to 1} f(x) = -\infty, \qquad f(1) = 2,$$

and s.t. $$\lim_{x\to 2} f(x) = 1, \qquad f(2) = 0,$$

and s.t. $$\lim_{x\to -\infty} f(x) = -1, \qquad \lim_{x\to \infty} f(x) = -4.$$

0210-3. OLD2 Let $f(t) = (4t^{2/3} + 3)^{85}$.

Using the properties of limits,
show that f is continuous at 7.

0210-4. OLD2

Let $f(x) = \begin{cases} 2x + 5, & \text{if } x < -1 \\ 3, & \text{if } x = -1 \\ x^2 + 4, & \text{if } x > -1. \end{cases}$

a. Does $\lim_{x \to -1} f(x)$ exist? If so, compute it.

b. Is f continuous from the left at -1?

0210-5.
OLD2

Let $g(x) = \begin{cases} \cos(2x), & \text{if } x < 0 \\ 1, & \text{if } x = 0 \\ x^2 + 1, & \text{if } x > 0. \end{cases}$

a. Does $\lim_{x \to 0} g(x)$ exist? If so, compute it.

b. Is g continuous at 0?

0210-6.
OLD2

Let $g(x) = \begin{cases} \cos(2x), \text{ if } x < 0 \\ 1, \text{ if } x = 0 \\ x^2 + 1, \text{ if } x > 0. \end{cases}$

a. Does $\lim_{x \to -1} g(x)$ exist? If so, compute it.

b. Is g continuous at -1?

0210-7. OLD2 Let $f(x) = \sqrt[3]{x}$.

a. Is f continuous at 0?

b. Is f continuous on $[0, \infty)$?

c. Is f continuous?

0210-8. OLD2 Let $g(x) = 1/\sqrt[3]{x}$.

a. Is g continuous at 0?

b. Is g continuous on $(0, \infty)$?

c. Is g continuous?

0210-9. OLD2 Compute $\displaystyle\lim_{x \to 27} \frac{x + \sqrt[3]{x}}{(x - 20)^2 - 2x + 6}$.

0210-10. Let $f(x) = \begin{cases} x^2+3, & \text{if } x<2 \\ 2x+2, & \text{if } 2\leq x<3 \\ 8[\cos(x-3)], & \text{if } 3\leq x. \end{cases}$

OLD2

a. At which numbers is the function f discontinuous?

b. For each of the numbers, given in Part a, where f is discontinuous, state whether or not f is continuous from the LEFT at that number.

c. For each of the numbers, given in Part a, where f is discontinuous, state whether or not f is continuous from the RIGHT at that number.

0210-11. Let $g(x) = \begin{cases} 4e^x, & \text{if } x \leq 0 \\ (x+2)^2, & \text{if } 0 < x < 1 \\ 7x+2, & \text{if } 1 < x. \end{cases}$

OLD2

a. At which numbers is the function g discontinuous?

b. For each of the numbers, given in Part a, where g is discontinuous, state whether or not the discontinuity is removable.

0210-12. OLD2 Find a number a s.t.

$$f(x) = \begin{cases} ae^x, & \text{if } x \leq 0 \\ ax^3 + 3a + 8, & \text{if } 0 < x \end{cases}$$

is continuous at $x = 0$.

0210-13. OLD2 Let $h(s) = \dfrac{s^2 + 5s - 6}{s - 1}$.

Find a function $p : \mathbb{R} \to \mathbb{R}$

such that p is continuous at 1

and such that, $\forall s \in \mathbb{R} \backslash \{1\}, \quad p(s) = h(s)$.

0210-14.
OLD2

Using the Intermediate Value Theorem,
show that $x^3 + 2x - 8 = 0$ has a solution $x = c$
that satisfies $-2 < c < 2$.

0210-15.
OLD2

Using the Intermediate Value Theorem,
show that $4e^x + \cos x = x + 6$ has a sol'n $x = c$
that satisfies $-2 < c < 9$.