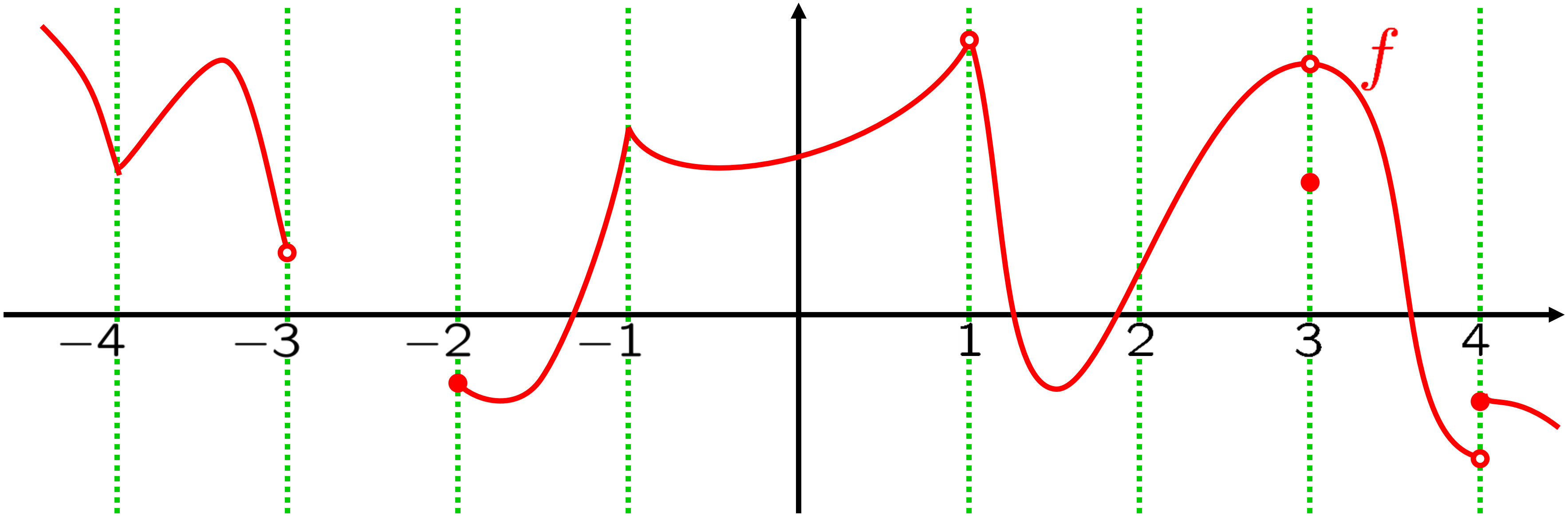
CALCULUS
Continuity
NEW



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

NEW

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.

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

s.t. $\lim_{x\to -2^-} f(x) = -1$, $\lim_{x\to -2^+} f(x) = 2$,

and s.t. $f(-2) = 2$,

and s.t. $\lim_{x\to 1} f(x) = 3$, $f(1) = 2$,

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

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

0210-3. [NEW] Let $f(s) = \sqrt[3]{s^4 + s}$.
Using the properties of limits,
show that f is continuous at 5.

0210-4. [NEW]

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

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

b. Is f continuous at -1?

0210-5.
NEW

Let $g(x) = \begin{cases} \cos(2x), & \text{if } x < 0 \\ 2, & \text{if } x = 0 \\ (x^3 - 1)^2, & \text{if } x > 0. \end{cases}$

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

b. Is g continuous at 0?

0210-6.
NEW

Let $g(x) = \begin{cases} \cos(2x), & \text{if } x < 0 \\ 2, & \text{if } x = 0 \\ (x^3 - 1)^2, & \text{if } x > 0. \end{cases}$

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

b. Is g continuous at -1?

0210-7. Let $f(x) = x^{2/3}$.
NEW

a. Is f continuous at 0?

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

c. Is f continuous?

0210-8. Let $g(x) = x^{-2/3}$.
NEW

a. Is g continuous at 0?

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

c. Is g continuous?

0210-9. Compute $\displaystyle\lim_{x \to 64} \frac{x + \sqrt[3]{x}}{(x - 60)^2 + x - 46}$.
NEW

0210-10. NEW Let $f(x) = \begin{cases} x^2+3, & \text{if } x<2 \\ 2x+2, & \text{if } 2 \le x \le 3 \\ 7[\cos(x-3)], & \text{if } 3<x. \end{cases}$

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. NEW Let $g(x) = \begin{cases} 4e^x, & \text{if } x < 0 \\ 8, & \text{if } x = 0 \\ 7x + 4, & \text{if } 0 < x. \end{cases}$

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. Find a number a s.t.
NEW

$$f(w) = \begin{cases} ae^{w}, & \text{if } w \leq 0 \\ 4aw^6 + 5a + 8, & \text{if } 0 < w \end{cases}$$

is continuous at $w = 0$.

0210-13. Let $g(z) = \dfrac{2z^2 + 10z - 12}{z + 6}$.
NEW

Find a function $q : \mathbb{R} \to \mathbb{R}$
such that q is continuous at -6
and such that, $\forall z \in \mathbb{R}\backslash\{-6\}, \quad q(z) = g(z)$.

0210-14.
NEW

Using the Intermediate Value Theorem,
show that $x^3+x+100001=0$ has a sol'n $x=c$
that satisfies $-101 < c < 101$.

0210-15.
NEW

Using the Intermediate Value Theorem,
show that $e^{3x}+\sin^2 x = x^2-1$ has a sol'n $x=c$
that satisfies $-\pi < c < \pi$.