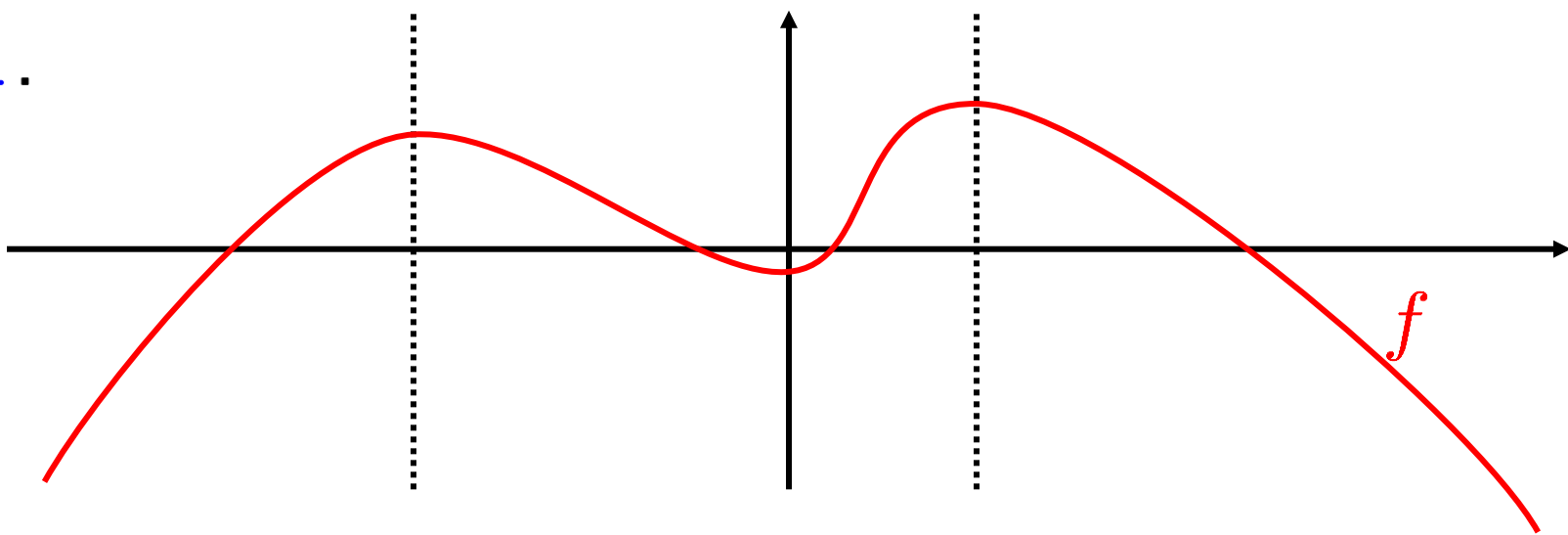


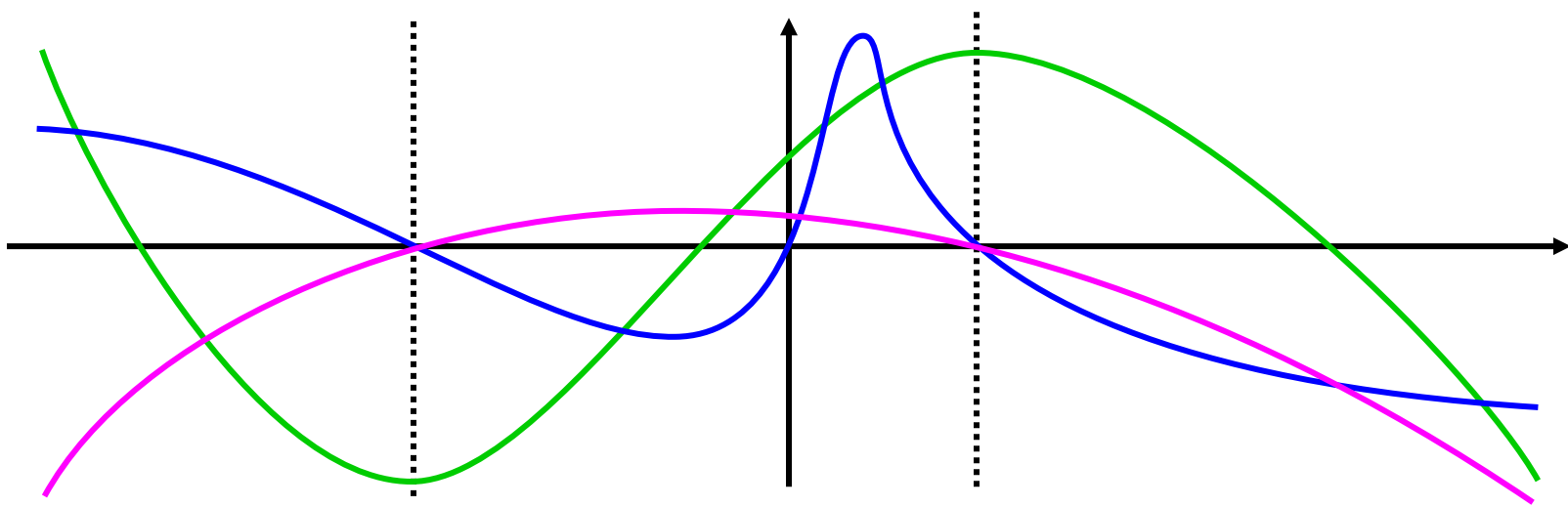
CALCULUS

The derivative of a function is a function

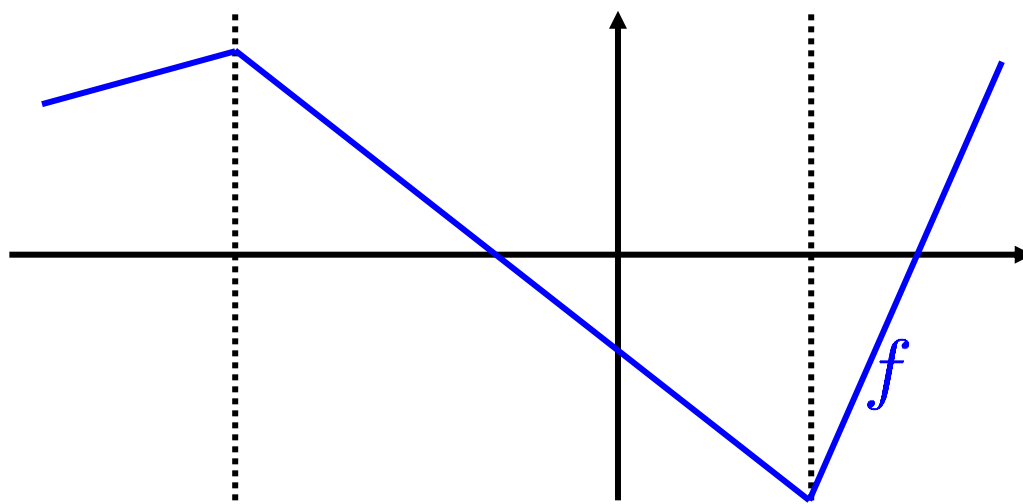
NEW



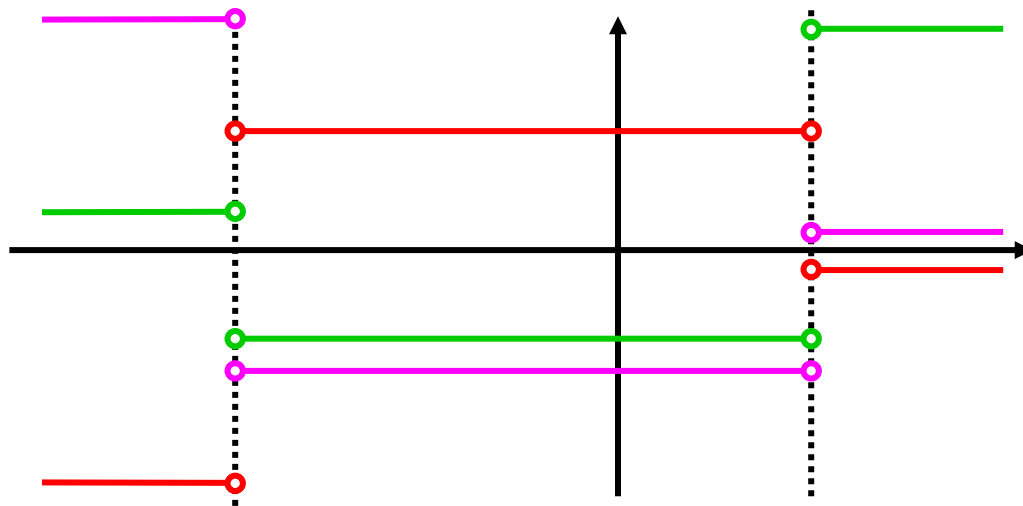
The graph of f is shown above.
Which of the following is the graph of f' ?



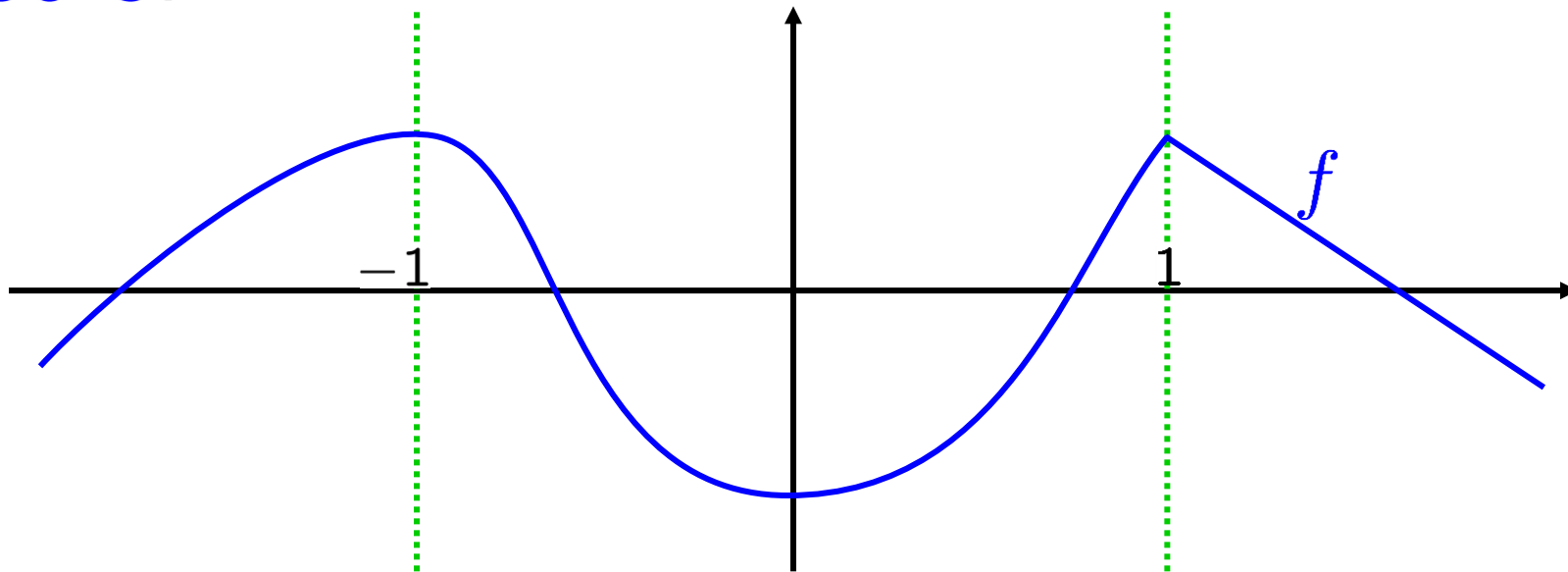
Choose **blue**, **green** or **purple**.



The graph of f is shown above.
Which of the following is the graph of f' ?



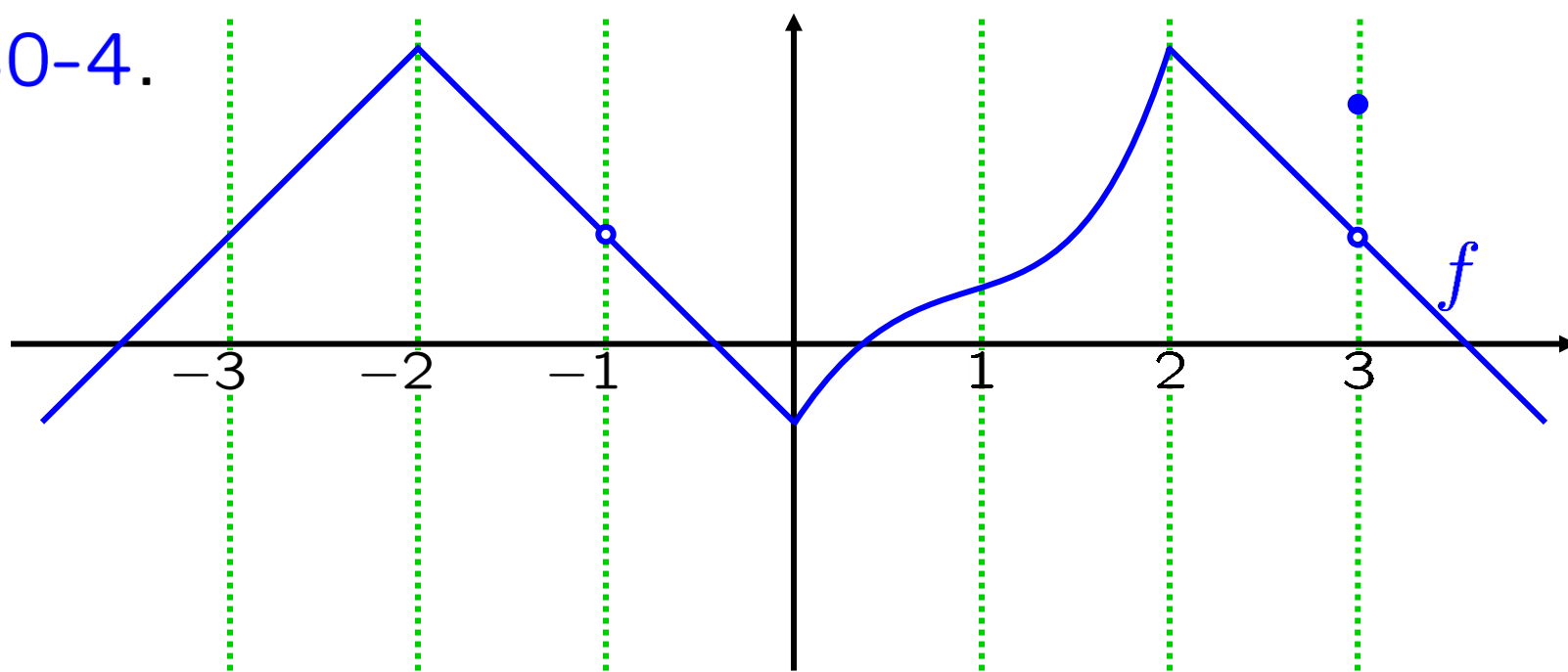
Choose **red**, **green** or **purple**.



The graph of f is shown above.

Freehand a sketch of the graph of f' .

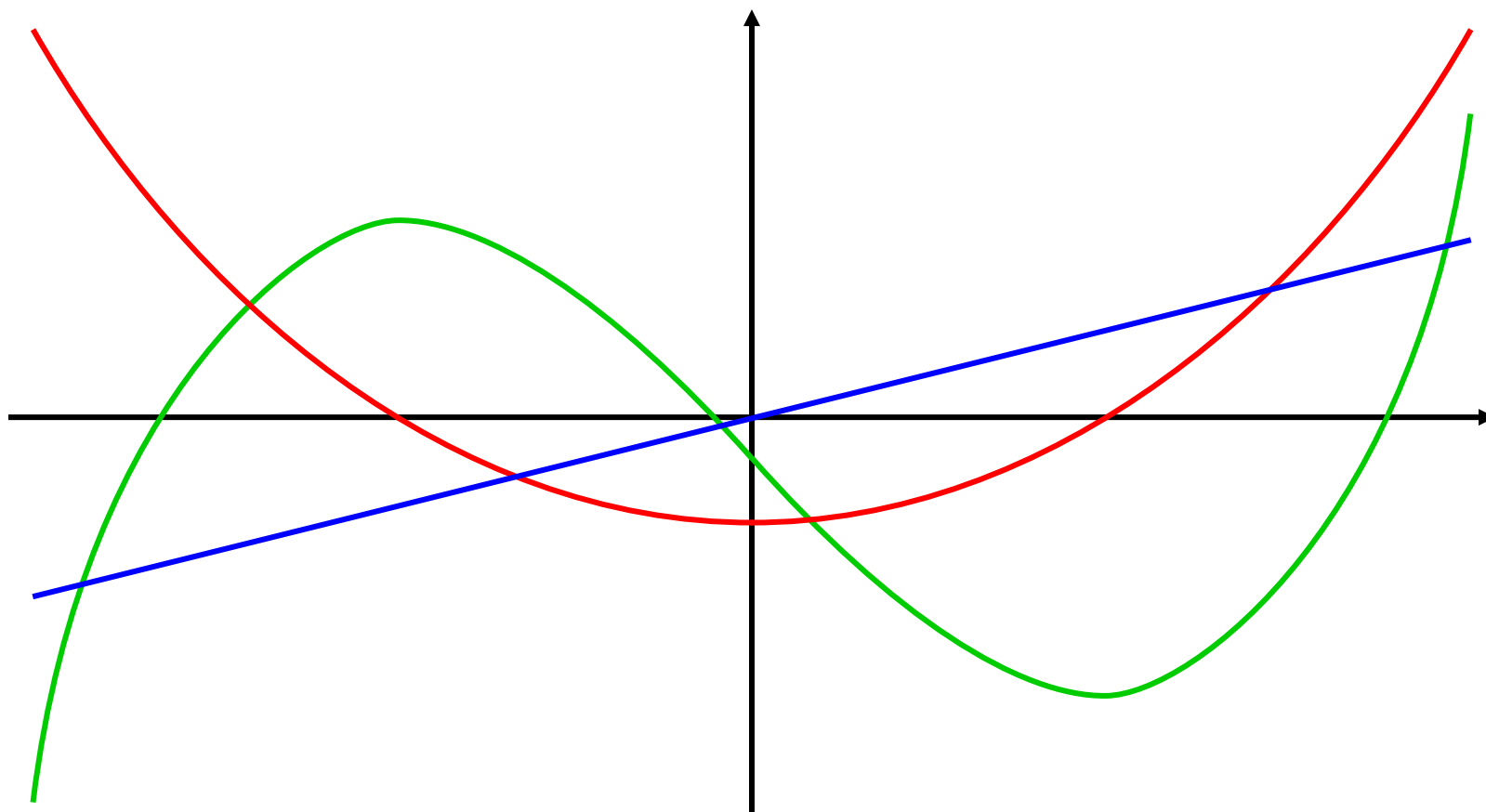
On your graph, indicate 1 and -1 on
the horizontal axis.



The graph of f is shown above.

- a. At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** defined?
- b. At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** continuous?
- c. At **which** of the numbers $-3, -2, -1, 0, 1, 2, 3$ is f **not** differentiable?

0280-5.
NEW



The graphs of f , f' and f'' are shown above.
Which is which?

State the color of f ,
the color of f' and the color of f'' .

0280-6. Let $f(t) = 2t^4 + 4$.

a. What is the domain of f ?

b. Using the definition of the derivative, and using the quartic binomial formula

$$(a + b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4,$$

compute $f'(t)$.

c. What is the domain of the derivative f' ?

0280-7. NEW Let $f(q) = \frac{-1 + 2q}{4 + q}$.

a. What is the domain of f ?

b. Using the definition of the derivative, compute $f'(q)$.

c. What is the domain of the derivative f' ?

0280-8. Let $g(x) = |x^2 + 2x + 2|$.

NEW

At which numbers is g not differentiable?

Hint: Determine the (maximal) intervals where $x^2 + 2x + 2$ is positive and negative.

Sketch the graph of $y = x^2 + 2x + 2$.

Sketch the graph of $y = g(x)$.

GENERAL RULE:

At numbers x where $x^2 + 2x + 2$ has a root of multiplicity one, g is not differentiable.

Everywhere else, g is differentiable.

0280-9. NEW Let $f(x) = |x^3 + 2x^2 + 2x|$.

At which numbers is f not differentiable?

Hint:

$y = x^3 + 2x^2 + 2x$ is hard to graph,
but you don't have to; just use the...

GENERAL RULE:

At numbers x where $x^3 + 2x^2 + 2x$ has a root of multiplicity one, f is not differentiable.

Everywhere else, f is differentiable.