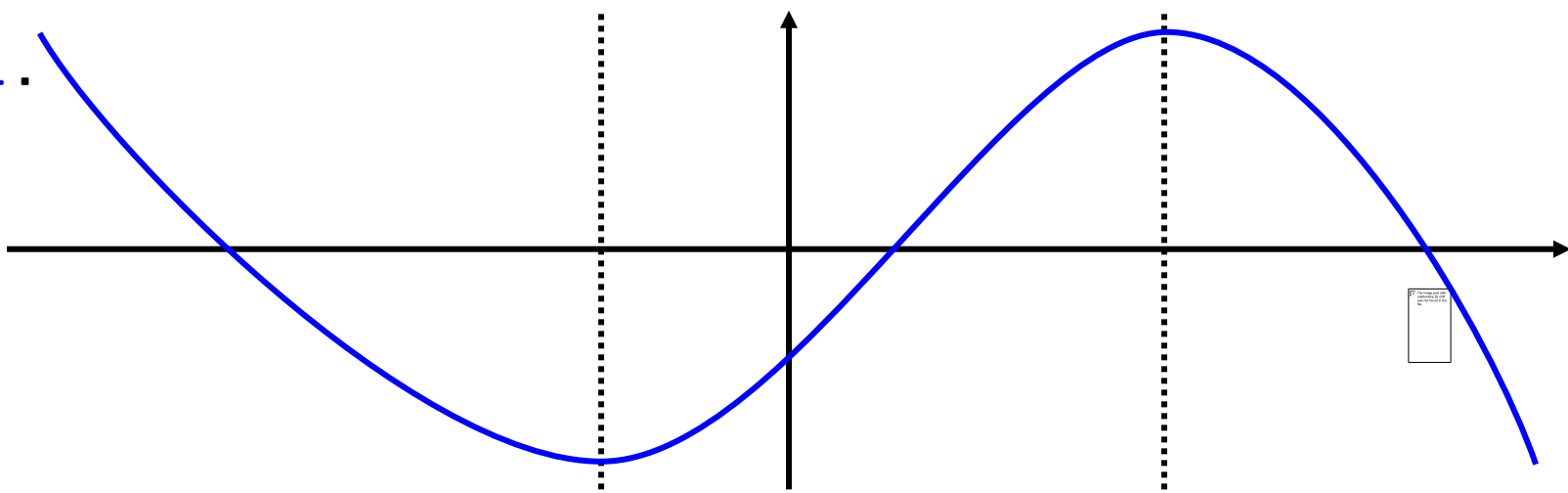


CALCULUS

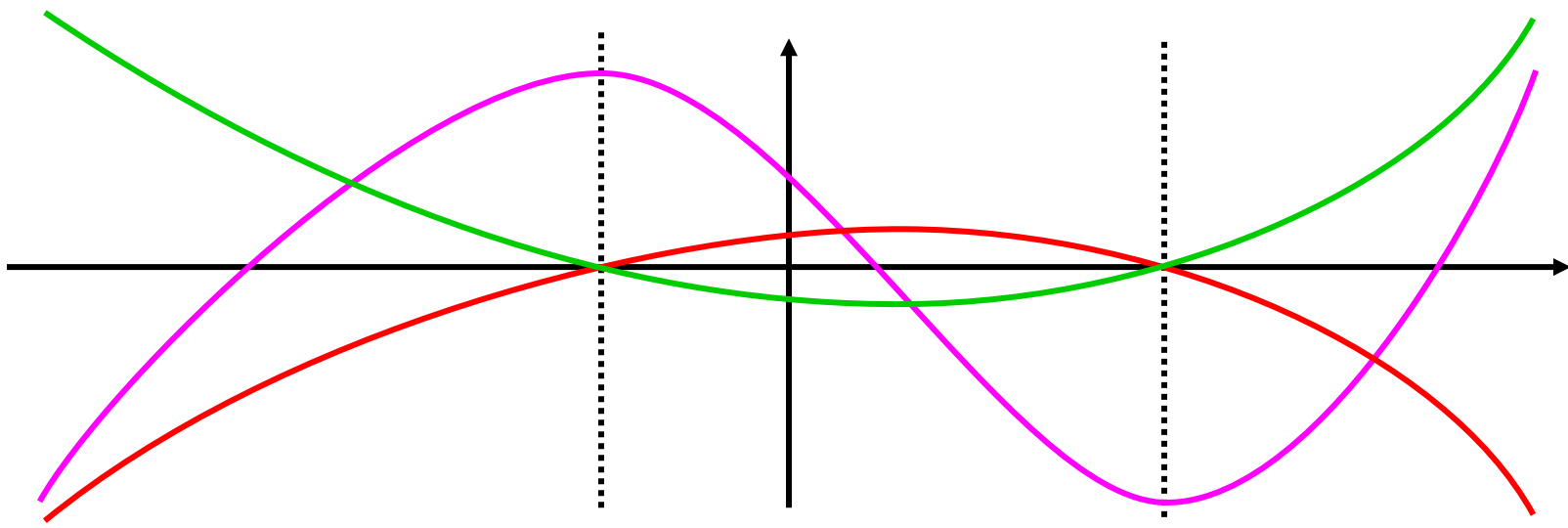
The derivative of a function is a function

OLD2

0280-1.
OLD2



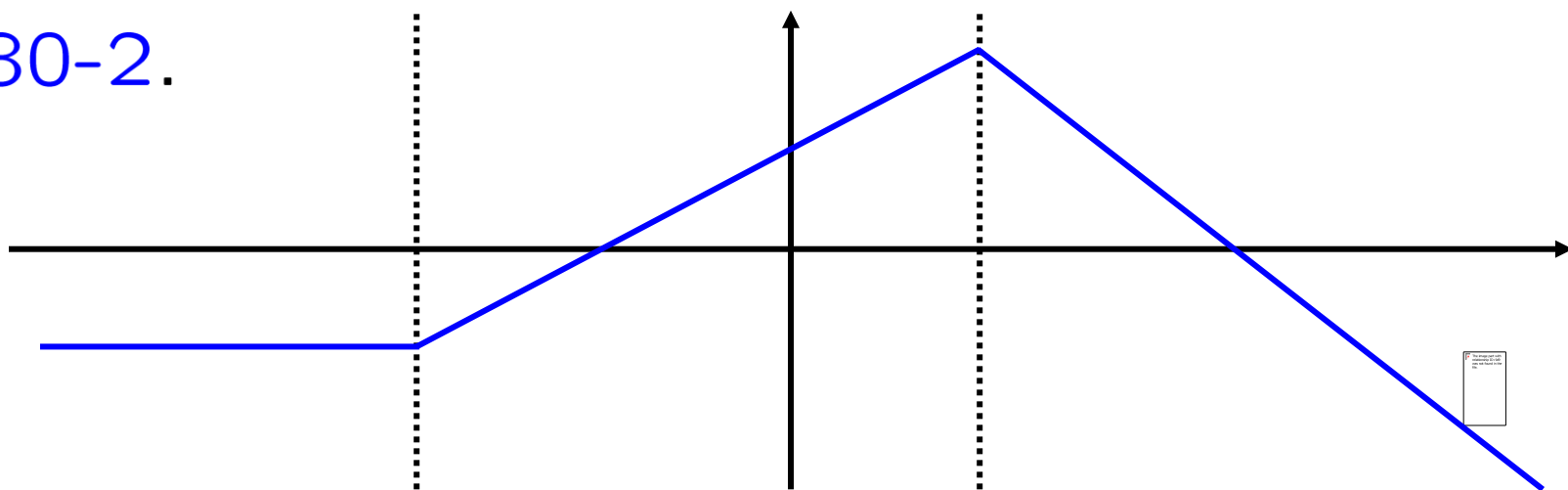
The graph of f is shown above.
Which of the following is the graph of f' ?



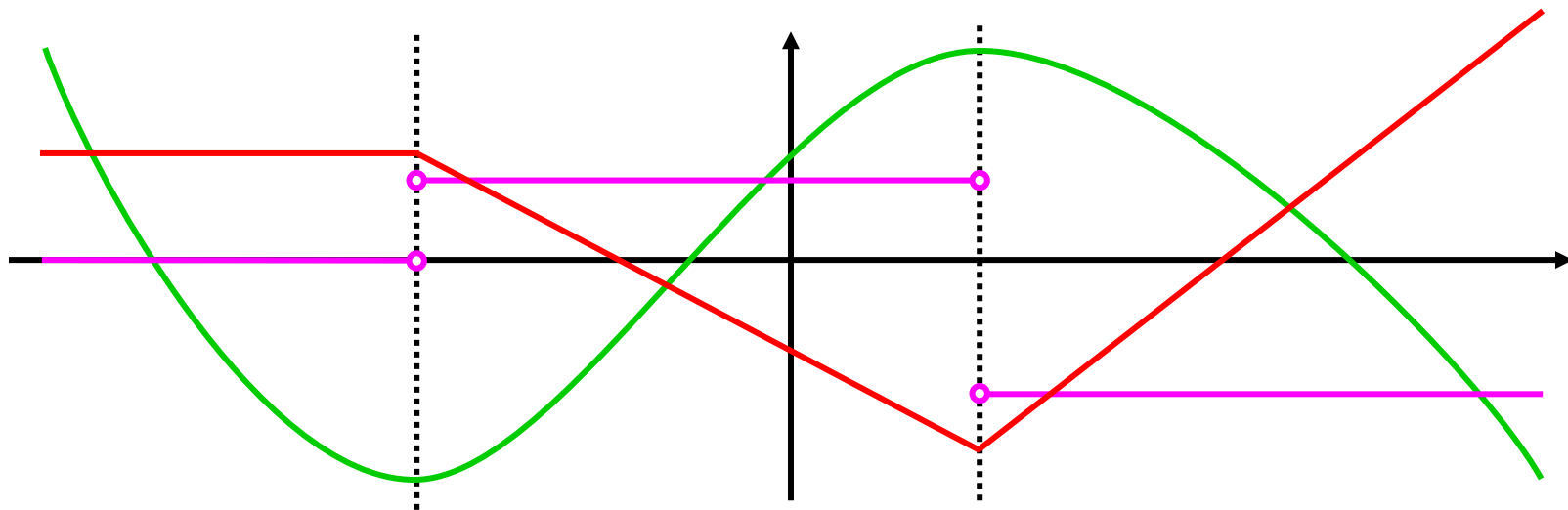
Choose red, green or purple.



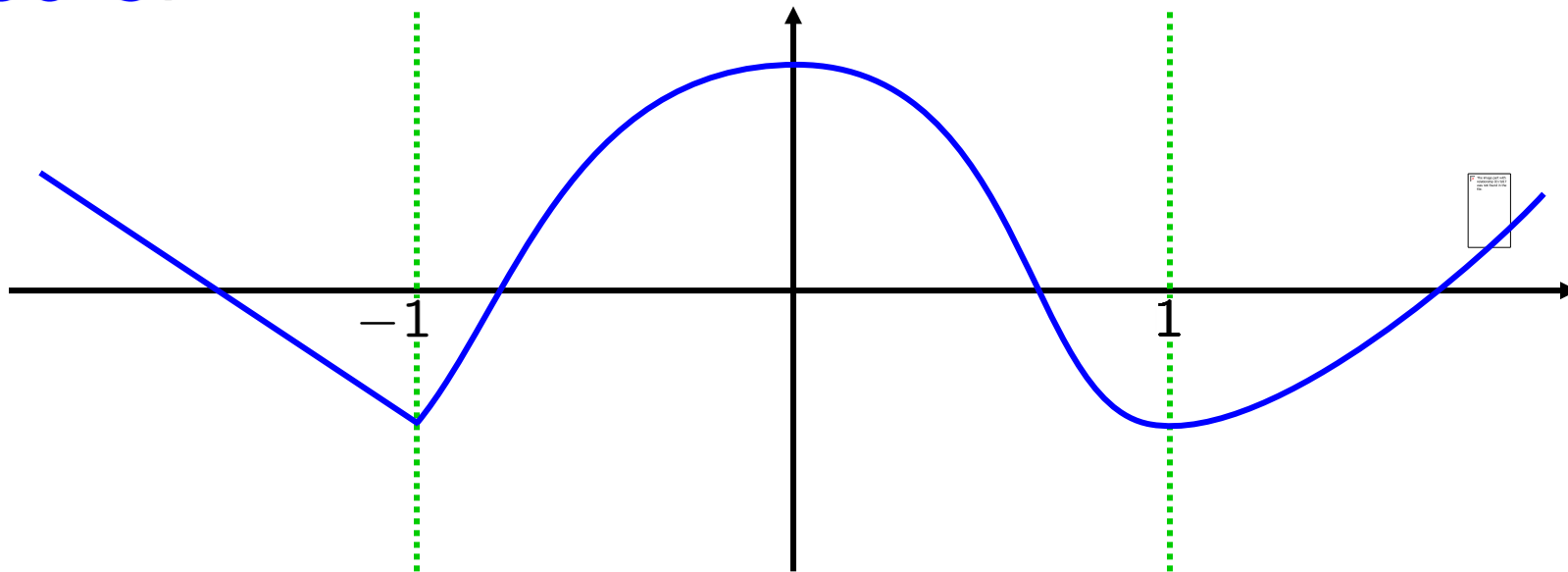
0280-2.
OLD2



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



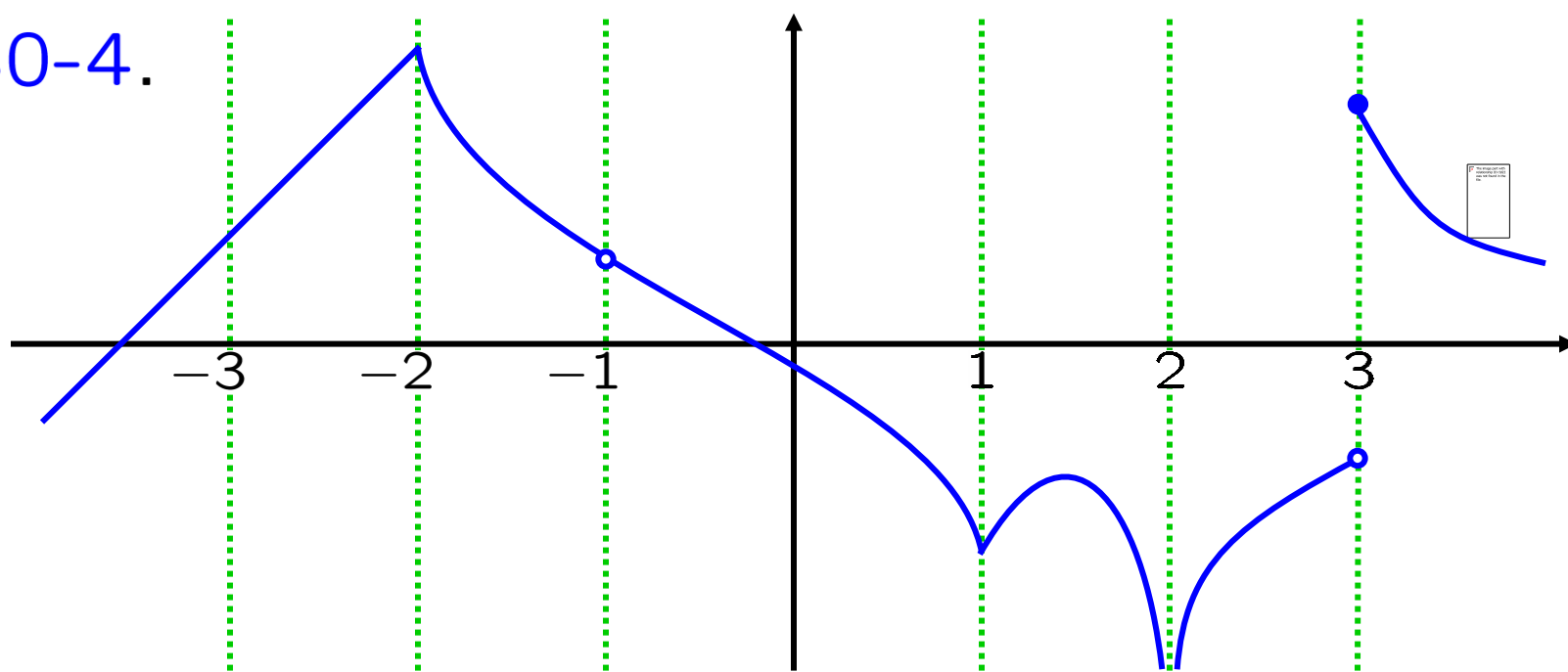
Choose red, green or purple.



The graph of f is shown above.

Freehand a sketch of the graph of f' .

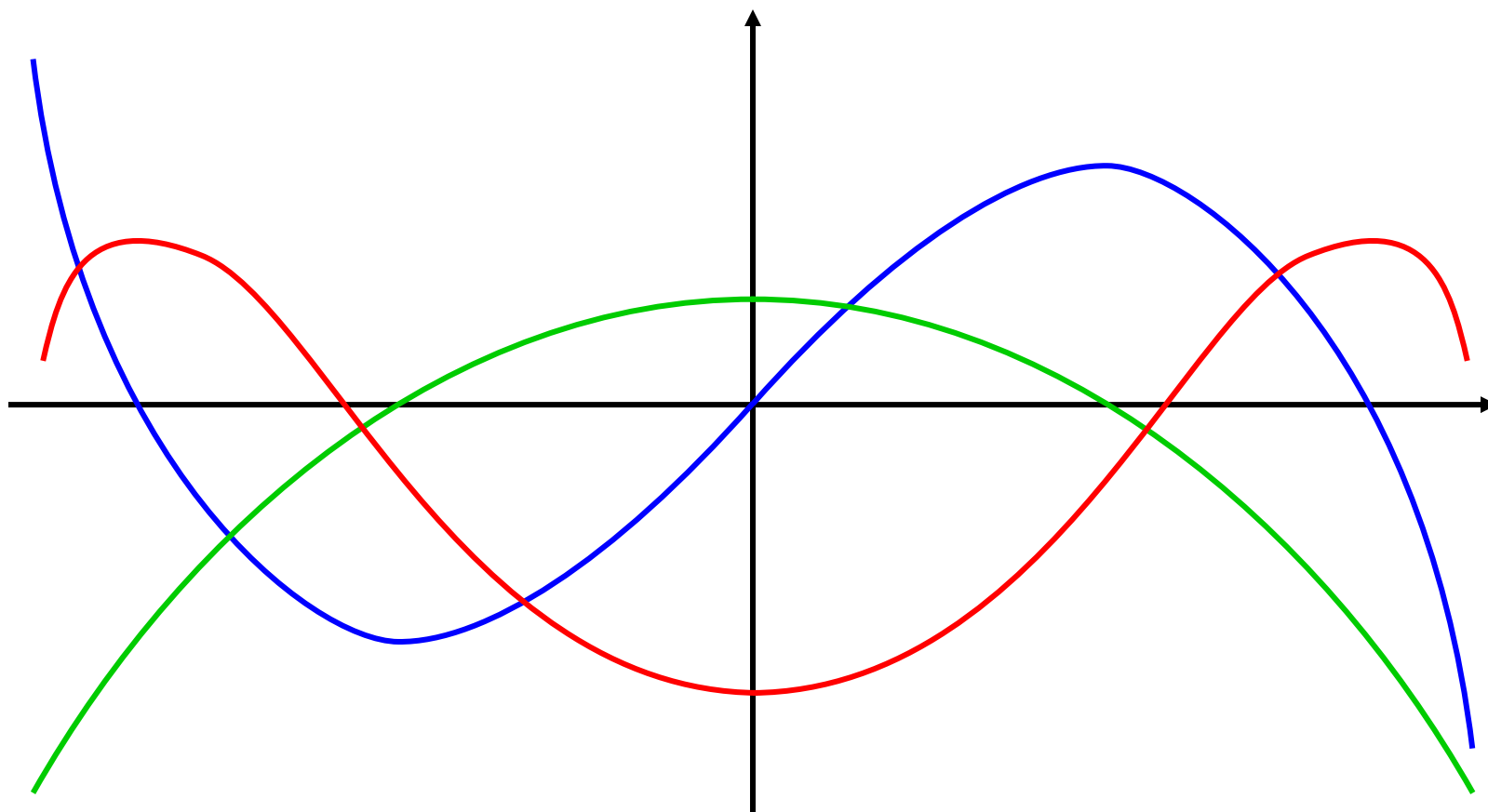
On your graph, indicate 1 and -1 on the horizontal axis.



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.
OLD2



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 $f(s) = 5s^3 - 4s$.
OLD2

a. What is the domain of f ?

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

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

compute $f'(s)$.

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

0280-7. OLD2 Let $f(x) = \frac{1 + 3x}{4 - 2x}$.

a. What is the domain of f ?

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

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

0280-8. Let $f(x) = |x^2 - 3x - 4|$.

OLD2

At which numbers is f not differentiable?

Hint: Determine the (maximal) intervals where $x^2 - 3x - 4$ is positive and negative.

Sketch the graph of $y = x^2 - 3x - 4$.

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

GENERAL RULE:

At numbers x where $x^2 - 3x - 4$ has a root of multiplicity one, f is not differentiable.

Everywhere else, f is differentiable.

0280-9. Let $f(x) = |x^4 - 3x^3 - 4x^2|$.

OLD2

At which numbers is f not differentiable?

Hint:

$y = x^4 - 3x^3 - 4x^2$ is hard to graph,
but you don't have to; just use the...

GENERAL RULE:

At numbers x where $x^4 - 3x^3 - 4x^2$ has a root of multiplicity one, f is not differentiable.

Everywhere else, f is differentiable.