DERIVATIVES AND SHAPE

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Name: _____

CRITICAL NUMBERS

Find the critical numbers of the given function

1. $f(x) = x^3 + 6x^2 - 15x$

2. $f(x) = 2x^3 + x^2 + 2x$

3. $f(x) = |3x - 4|$

4. $f(x) = \dfrac{x - 1}{x^2 - x + 1}$

FIRST DERIVATIVES

For each function use the first derivative to find

- the interval(s) where the given function is increasing
- the interval(s) where the given function is decreasing
- the local maximum/minimum values

5. $f(x) = 2x^3 - 9x^2 + 12x - 3$

6. $f(x) = x^4 - 2x^2 + 3$

7. $f(x) = \dfrac{x}{x^2 + 1}$

8. $f(x) = \dfrac{x^2}{x - 4}$

Second Derivatives

For each function use the second derivative to find

- the interval(s) where the given function is concave up
- the interval(s) where the given function is concave down
- the inflection points

9. $f(x) = 2x^3 - 9x^2 + 12x - 3$

10. $f(x) = x^4 - 2x^2 + 3$

11. $f(x) = \dfrac{x}{x^2 + 1}$

12. $f(x) = \dfrac{x^2}{x - 4}$