

Name:

Date:

## 6 – 4.5 An Algorithm for Curve Sketching

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### Lesson Goals:

- Be able to use the algorithm for curve sketching to sketch functions

### 1) Algorithm for Curve Sketching

- Advanced Functions graphing steps:
  - 1) Domain
  - 2)  $x$ -intercepts and  $y$ -intercepts
  - 3) Holes
  - 4) Vertical asymptotes
  - 5) Horizontal (or slant) asymptotes
- Calculus graphing steps:
  - 6) First derivative ( $y'$ )
    - Critical points of  $y$
    - Possible extrema
  - 7) Second derivative ( $y''$ )
    - Critical points of  $y''$
    - Possible points of inflection
  - 8) Combined sign chart and identify
    - Intervals of increase/decrease using  $y'$  and local max/min
    - Intervals of concavity using  $y''$  and points of inflection
    - Draw a matching shape of curve
  - 9) Graph the curve
    - Start with asymptotes, then points, then draw the shape between points
    - Consider your grid before drawing
    - Label with exact values when key points are not obvious on grid

## 2) Practice

Graph the following. Check your graph using graphing software.

1)  $y = x^3 + 4x - 5$

2)  $y = x^2 + \frac{16}{x}$

3)  $y = x\sqrt{x+2}$

4)  $y = x + \frac{1}{x}$

5)  $y = x^4 + 4x^3$

6)  $y = (x^2 + 1)(x - 1)$

7)  $y = \frac{1}{100}(x^5 - 5x^4)$

8)  $y = (1 - x^2)^2 - 2$

9)  $g(x) = x^4 - 3x^2 + 2x$

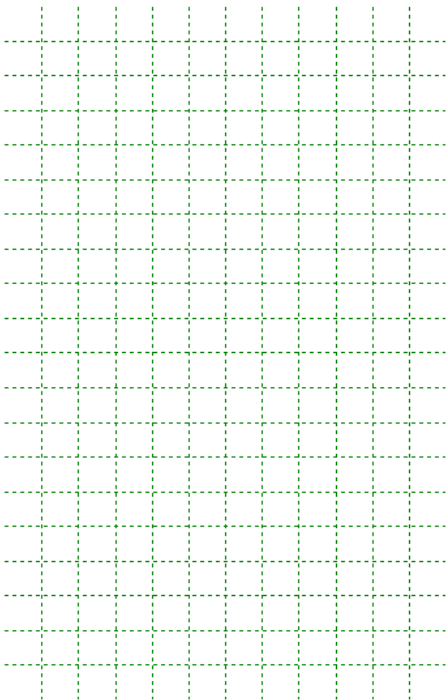
10)  $f(x) = 3x^5 - 5x^3$

11)  $y = \frac{x^3-2}{x}$

12)  $f(x) = \frac{1}{1+x^2}$

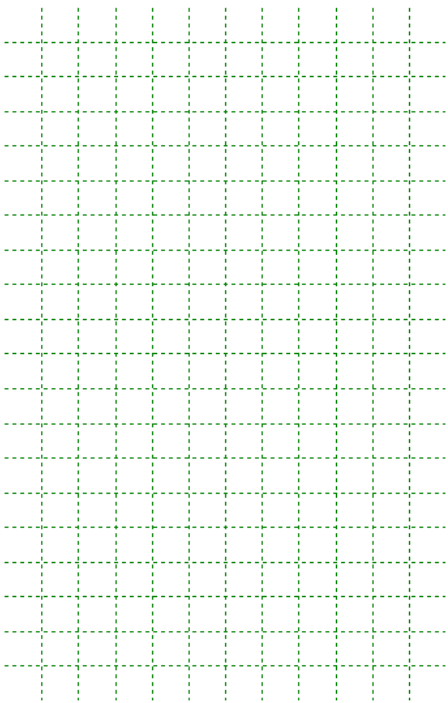
13)  $f(x) = \frac{x^2}{1-x^2}$

**Example 1:** Graph  $f(x) = x^{\frac{1}{3}}(x + 3)^{\frac{2}{3}}$ .



**Homework:** Worksheet Practice 1-10

**Example 2:** Graph  $f(x) = \frac{x^2-3x}{x-4}$ .



**Homework:** Worksheet Practice 11-13 and Page 213 #4 (c, e, f-j), 6, 7, 9