**PDF 4.050 Graphing Curves**

Algorithm for Curve Sketching

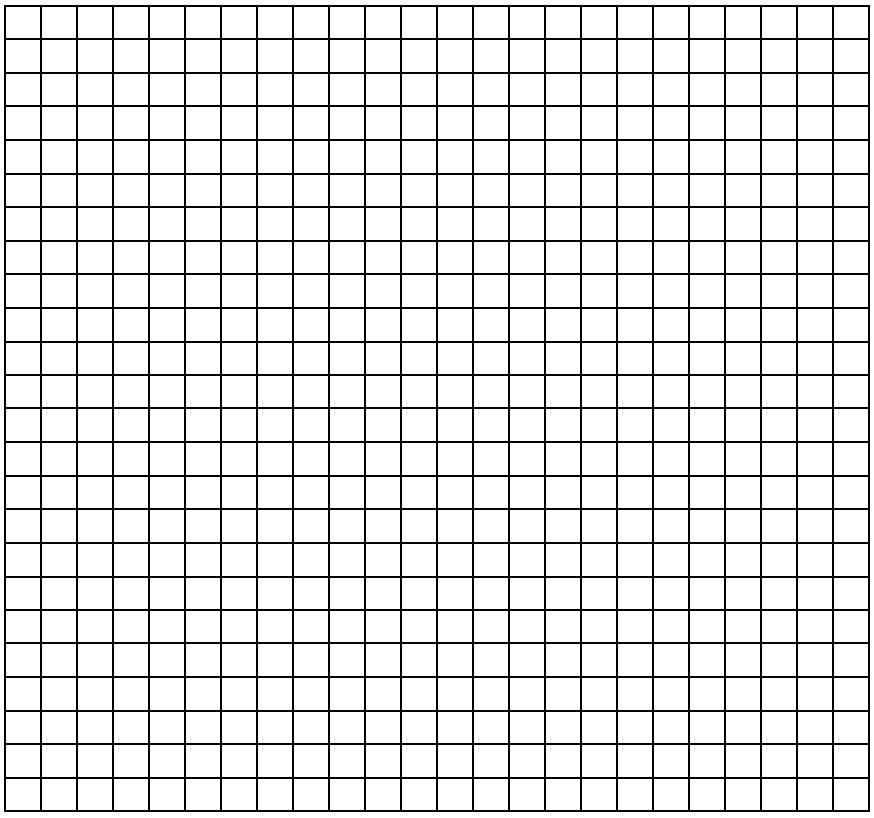
1. Determine y-intercept if it exists (let x = 0)
2. Determine x-intercepts if they exist (let y = 0)
3. Determine any holes (including y-coordinate) or vertical asymptotes
4. Determine any horizontal or oblique asymptotes
5. Determine intervals of increase and decrease (determine x-values at which y' is zero or undefined and do interval testing)
6. Determine intervals of concavity (determine x-values at which y'' is zero or undefined and do interval testing)
7. "Stack" the intervals created in numbers 5 and 6
8. Determine the associated y-values of any points where y' or y'' is zero or undefined and graph those points
9. Don't forget what you already know about graphs ☺

For the following diagrams, assume that the function is defined all the way through the interval

| | | |
|---|---|---|
| $y'$ + 0 - <br> $y''$ Negative all the way | $y'$ - 0 + <br> $y''$ Positive all the way | $y'$ + 0 + <br> $y''$ - 0 + |
| $y'$ - 0 - <br> $y''$ + 0 - | $y'$ + undefined + <br> $y''$ + undefined - | $y'$ - undefined - <br> $y''$ - undefined + |
| $y'$ + undefined - <br> $y''$ + undefined + | $y'$ - undefined + <br> $y''$ - undefined - | |

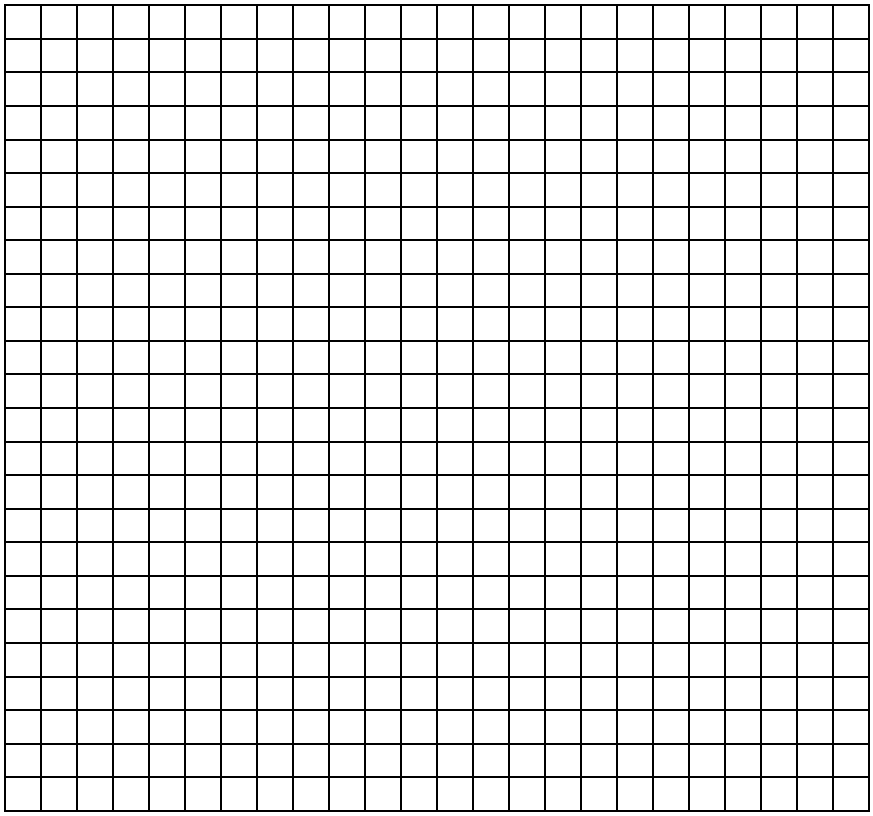
Example 1

Graph the curve $y = x^3 - 7x^2 + 15x - 9$



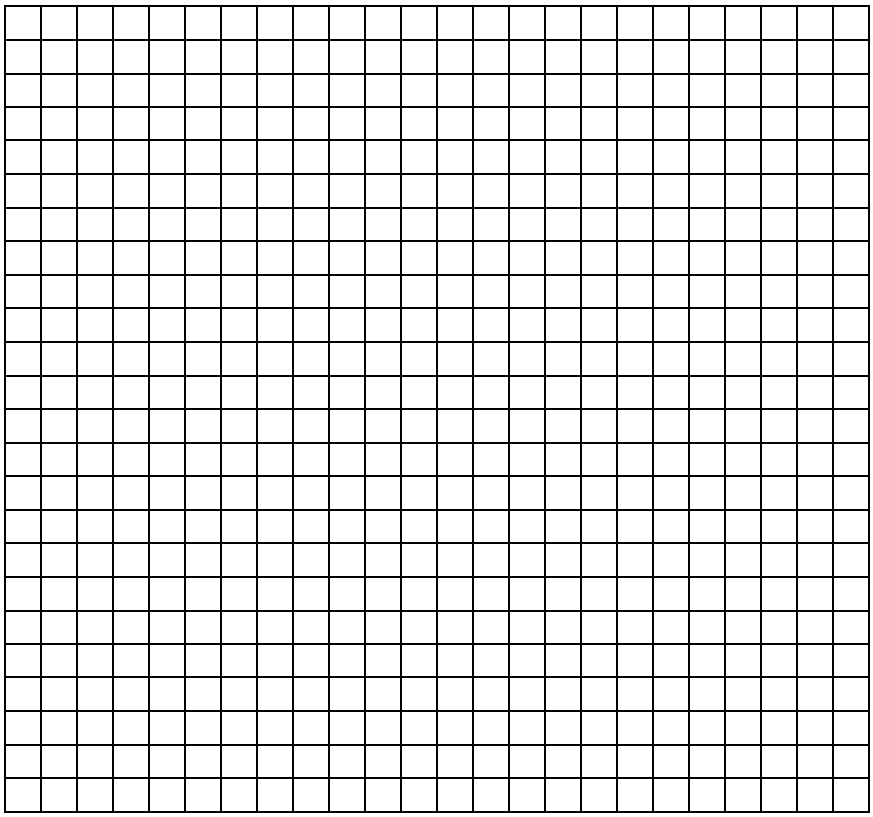
Example 2

Graph the curve $y = \frac{x}{x^2-4}$



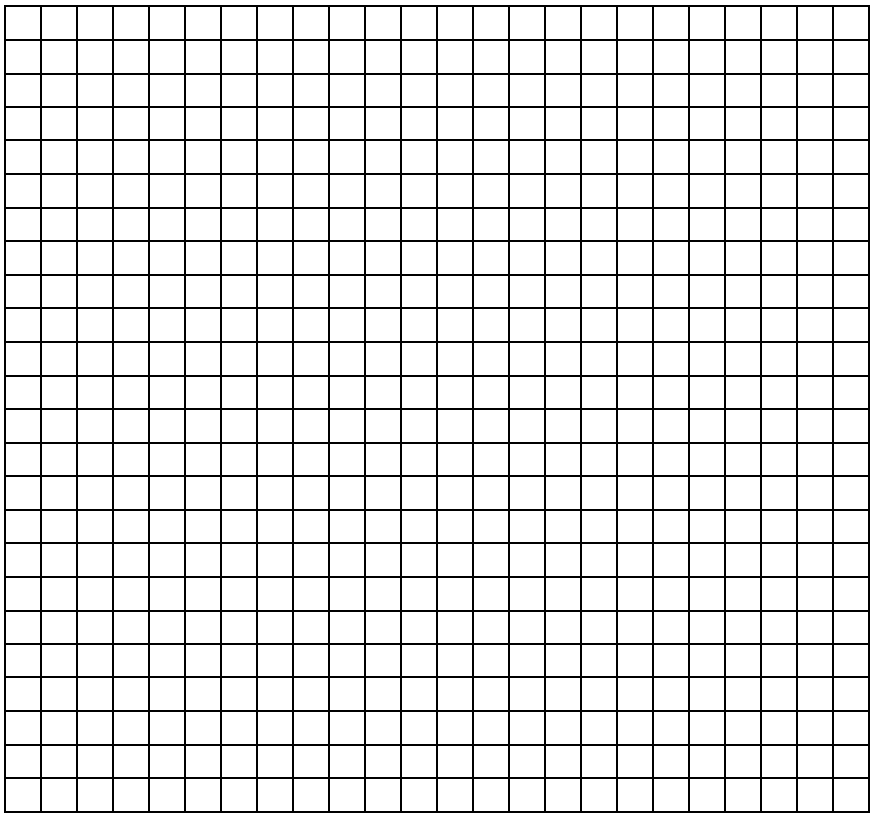
Example 3

Graph the curve $y = \frac{1}{x^2-4x-5}$



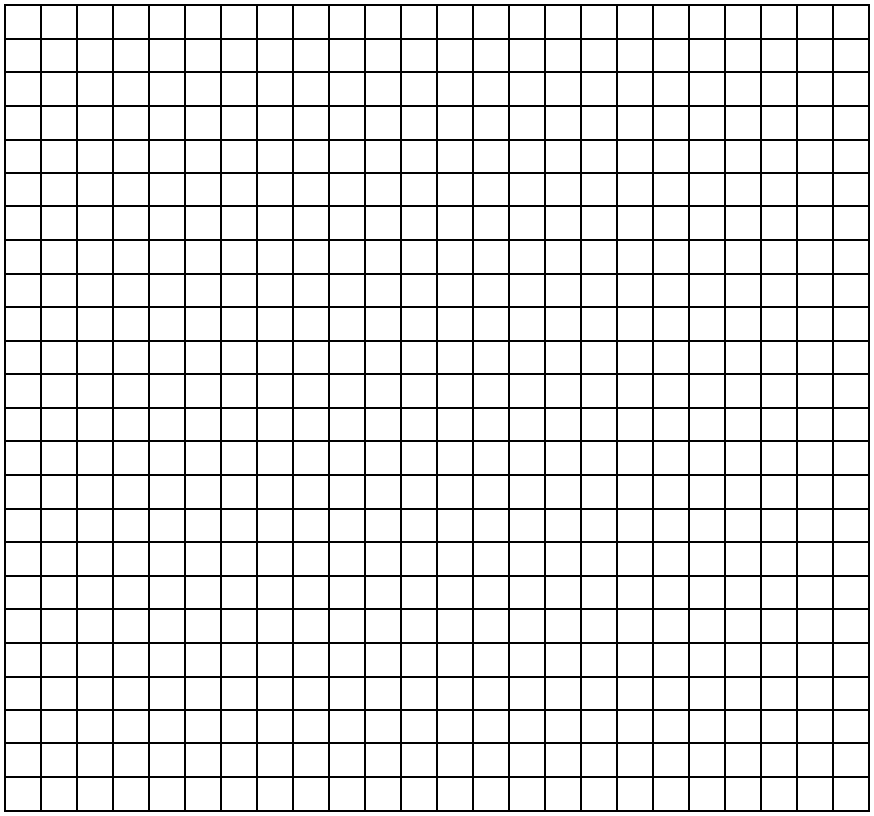
Example 4

Graph the curve $y = \frac{1}{x^2-6x+12}$



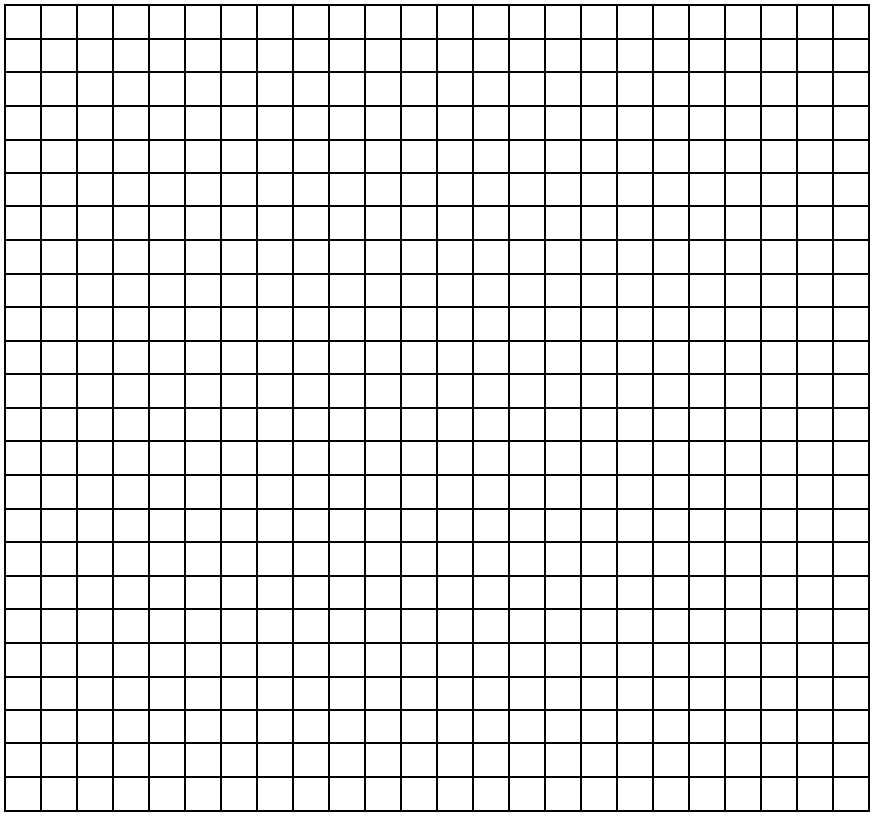
Example 5

Graph the curve $y = \frac{x^2-4x+7}{x-3}$



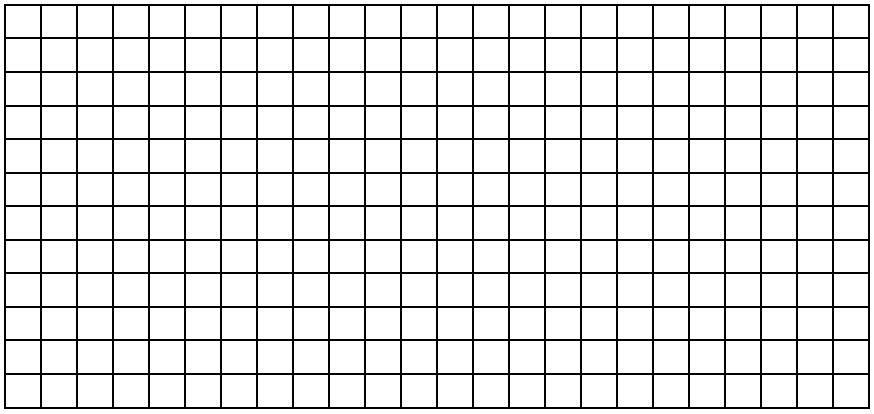
Example 6

Graph the curve $y = \frac{x^2-4x-1}{x-1}$



Example 7

Graph the curve $y = (x-2)^{\frac{4}{5}}$



Example 8

Graph the curve $y = x^{\frac{2}{5}}(x-4)^{\frac{3}{5}}$