MA1S11 (Dotsenko) Tutorial/Exercise Sheet 2

Week 3, Michaelmas 2013

Please hand in your work in the end of the tutorial. Make sure you put your name and student ID number on what you hand in.

A complete solution to every question is worth 2 marks.

Reminder:

- A curve in the xy plane is symmetric
  1. about the x-axis if for any point (x, y) on the curve the point $(x, -y)$ is also on the curve.
  2. about the y-axis if for any point (x, y) on the curve the point $(-x, y)$ is also on the curve.
  3. about the origin if for any point (x, y) on the curve the point $(-x, -y)$ is also on the curve.
- Suppose that for a function f there exists a function g such that

$$f(g(x)) = x \text{ for all } x \text{ in the domain of } g,$$
$$g(f(x)) = x \text{ for all } x \text{ in the domain of } f.$$

  Then g is said to be the inverse of f, and is denoted by f^{-1}.

Questions

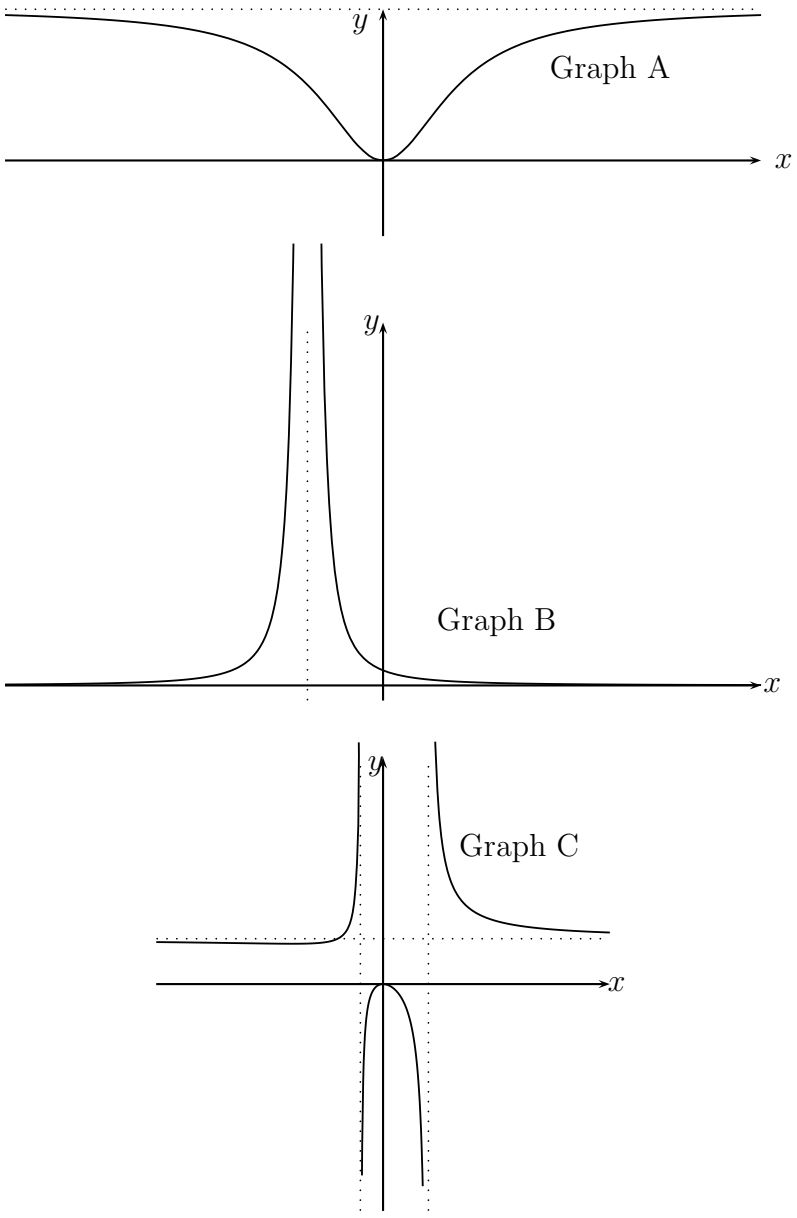
1. Determine the symmetry properties (symmetry about x-axis, about y-axis, about the origin or none at all) of the following curves in the xy plane (you do not need to plot the graphs!):

$$y = x^4 + \frac{3}{x^2} - 2, \qquad y^5 = x^5 + x\cos(x), \qquad 2x^2 + \frac{y^2}{5} = 1, \qquad y^5 = \frac{1}{x} + x^3 + 1.$$

2. Show that the function $f(x) = 2\sqrt[3]{x-7} + 1$ has an inverse, and compute its inverse.

3. State the geometric property common to all lines in the family $y = -x + b$. State the geometric property common to all lines in the family $y = mx + 3$.

4. The following three graphs A, B, and C correspond (in some order) to the equations (1) $y = \frac{x^2}{x^2-x-2}$, (2) $y = \frac{2x^2}{x^2+1}$, (3) $y = \frac{4}{(x+2)^2}$. Match the graphs with the equations, and explain your reasoning.



5. In the previous question, give equations for horisontal and vertical asymptotes of the given graphs.