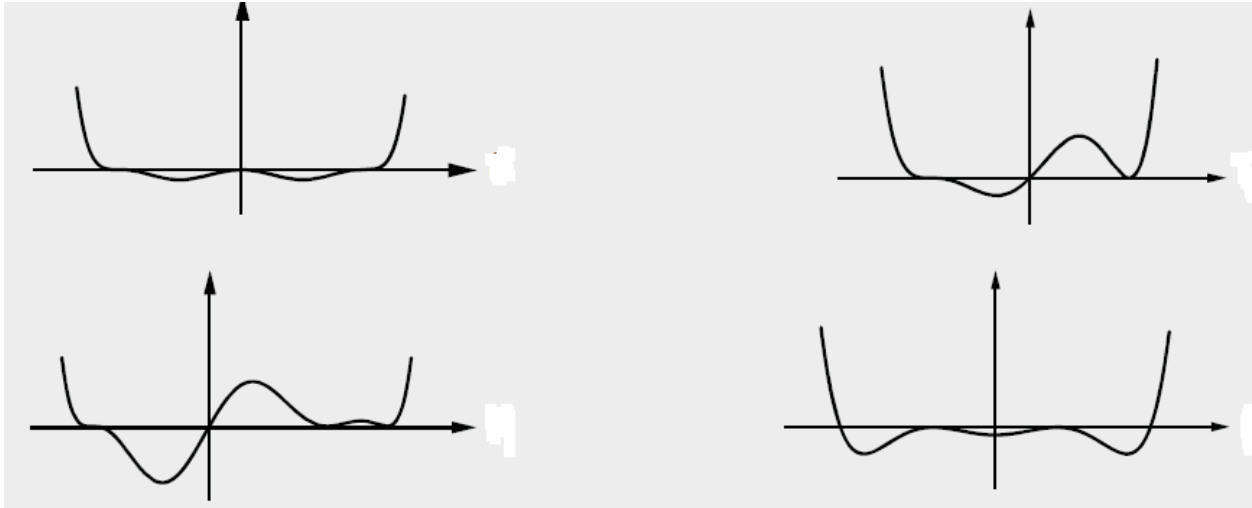


1. Which graph can be the plot of function

$$f(x) = x(x - 1)^2(x + 1)^3 ?$$



2. For what values of a , function $f(x) = x^3 + ax^2 + x$ is increasing everywhere?

3. Find the interval(s) over which $f(x) = (x - 1)^3(x + 1)$ is decreasing.

4. Function $f(x)$ is positive and strictly decreasing everywhere. Which one of these functions is increasing?

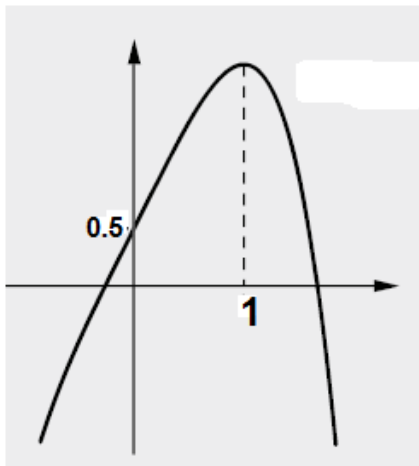
a. $\frac{1}{f(x)}$ b. $\sqrt{f(x)}$ c. $f^3(x)$ d. $f(x^2)$

5. For what values of a the function

$$f(x) = \frac{ax - 5}{x + a - 6}$$

is increasing for all $x > 1$?

6. The figure below is the graph of function $f(x) = ax^4 + bx^3 + 2x + c$. Find the coefficients a, b and c and determine the value of local maximum.

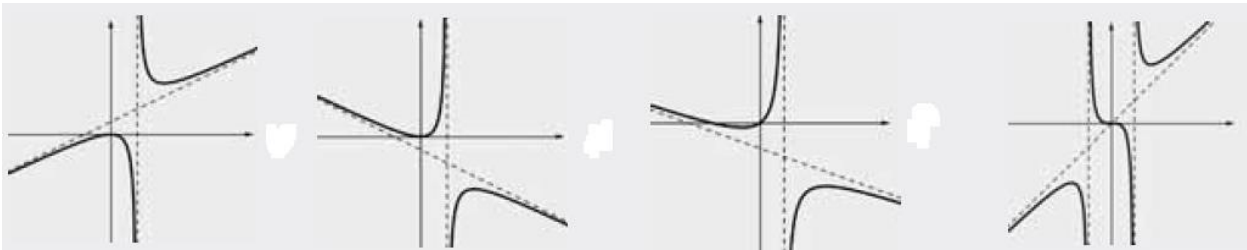


7. The graph below is function of $f(x) = 3x^5 + ax^3 + bx^2 + cx + d$. Find all coefficients a, b, c and d .



8. Which graph can belong to the function

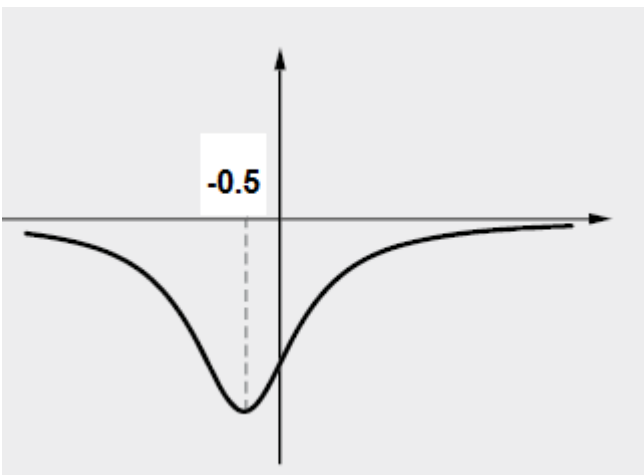
$$f(x) = \frac{x^2}{2x - 4}$$



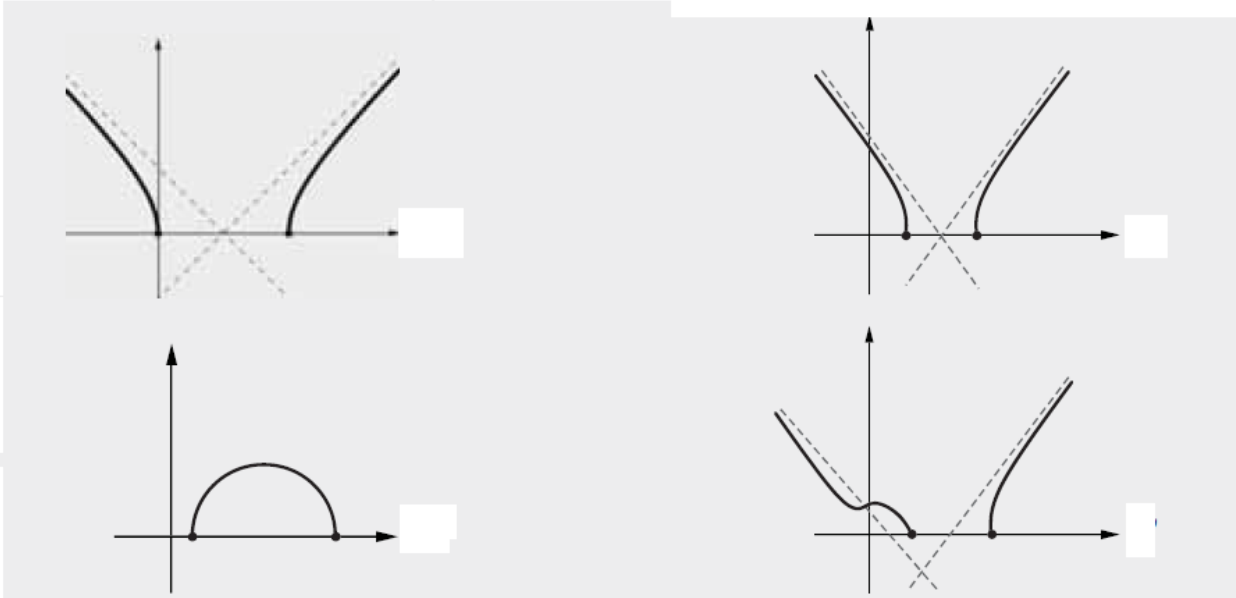
9. The graph of function

$$f(x) = \frac{ax^2 + bx - 2}{x^2 + cx + 1}$$

is shown in figure below. Find the values of a, b and c .



10. Which one can be the graph of function $f(x) = \sqrt{x^2 - 3x + 2}$



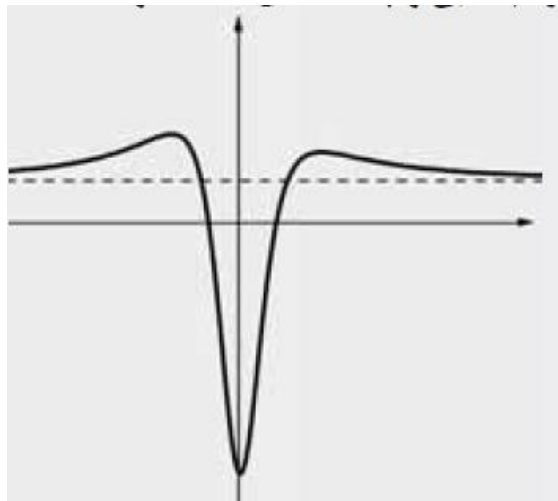
11. Sketch the curve of function

$$f(x) = e^{2x-x^2}$$

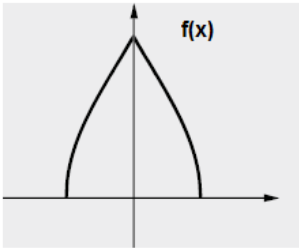
12. Sketch the curve of function

$$f(x) = \ln\left(\frac{x}{x-1}\right)$$

13. Figure below shows the graph of $f'(x)$. How many local maxima, local minima and inflection point does function $f(x)$ have?



14. Which figure can be the graph of derivative of function $f(x)$.



Four graphs are shown, each with a vertical input box to its right:

- a)** A graph of a function that is symmetric about the y-axis, starting at a positive value on the x-axis, decreasing to a minimum at the y-axis, and then increasing back to a positive value on the x-axis. The curve is concave up.
- b)** A graph of a function with two vertical asymptotes. The function is positive between the asymptotes and negative outside them. It has a local minimum at the y-axis.
- c)** A graph of a function that is symmetric about the y-axis, starting at a positive value on the x-axis, decreasing to a minimum at the y-axis, and then increasing back to a positive value on the x-axis. The curve is concave down.
- d)** A graph of a function with two vertical asymptotes. The function is positive between the asymptotes and negative outside them. It has a local maximum at the y-axis.