

MCS21 Homework 12

1. For each function, find:

- (i) equations of vertical asymptotes
- (ii) equations of horizontal asymptotes
- (iii) coordinates of any holes
- (iv) x-intercepts
- (v) y-intercepts

$$(a) f(x) = \frac{x^2}{x^2 + x - 6}$$

$$(b) f(x) = \frac{3x - 2}{\sqrt{2x^2 + 1}}$$

$$(c) f(x) = \frac{9 - 6x + x^2}{x^2 - 9}$$

$$(d) f(x) = \frac{x - 9}{\sqrt{4x^2 + 3x + 2}}$$

$$(e) f(x) = \frac{|x| + 1}{|x| - 1}$$

$$(f) f(x) = \frac{27x^3 - 1}{3x - 1}$$

2. Find the value of a and b for which each function is continuous.

$$a) f(x) = \begin{cases} x + 1 & x < 1 \\ ax + b & 1 \leq x < 2 \\ 3x & x \geq 2 \end{cases} \quad b) f(x) = \begin{cases} 2x^2 + 5 & x < -1 \\ ax + b & -1 \leq x \leq 2 \\ 8x & x > 2 \end{cases}$$

3. Find a value for the constant k , if possible, that will make the function continuous.

$$f(x) = \begin{cases} kx^3 - 2 & x > 1 \\ 4x^2 - 7x & x < 1 \\ -4 & x = 1 \end{cases}$$