MCS21 Homework 11

1. For each function, find:
   (i) equations of vertical asymptotes
   (ii) equations of horizontal asymptotes
   (iii) coordinates of any holes
   (iv) x-intercept(s)
   (v) y-intercept

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

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

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

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

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

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

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

a) $f(x) = \begin{cases} x + 1 & x < 1 \\ ax + b & 1 \le x < 2 \\ 3x & x \ge 2 \end{cases}$

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

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

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