1.   Determine the domain, in interval notation, for the following functions:

i) $f(x) = \dfrac{\sqrt{2x+3}}{x-5}$

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

iii) $f(x) = \dfrac{\sqrt{2x^3 - 3x^2 - 8x + 12}}{x-5}$

iv) $g(x) = \dfrac{\ln\dfrac{x^2 - x - 6}{x+1}}{x-5}$

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

vi) $g(x) = \dfrac{\sqrt{5-x}}{2x^3 - 5x^2 - 4x + 12}$

vii) $h(x) = \dfrac{\sqrt{2x^4 - 5x^3 - 3x^2}}{x^3 - 27}$

2.   Determine $\dfrac{f(x+h) - f(x)}{h}$ if:

i) $f(x) = \dfrac{2x-1}{3x+4}$

ii) $f(x) = \dfrac{2x}{x^2 - 3}$

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

iv) $f(x) = 2x^2 - x - 3$

Answers:

1.   i) $\left[-\dfrac{3}{2}, 5\right) \cup (5, \infty)$

ii) $\left(-\infty, -\dfrac{4}{3}\right) \cup \left[\dfrac{3}{2}, \infty\right)$

iii) $\left[-2, \dfrac{3}{2}\right] \cup [2, 5) \cup (5, \infty)$

iv) $(-2, -1) \cup (3, 5) \cup (5, \infty)$

v) $\left(-\infty, -\dfrac{1}{2}\right) \cup \left(-\dfrac{1}{2}, 1\right) \cup (1, 2]$

vi) $\left(-\infty, -\dfrac{3}{2}\right) \cup \left(-\dfrac{3}{2}, 2\right) \cup (2, 5]$

vii) $\left(-\infty, -\dfrac{1}{2}\right] \cup \{0\} \cup (3, \infty)$

2.   i) $\dfrac{11}{(3x+4)(3x+3h+4)}$ ii) $\dfrac{-2(x^2+xh+3)}{(x^2-3)\left((x+h)^2-3\right)}$

     iii) $\dfrac{6+2x^2+2xh+2x+h}{(3-x^2)(3-x^2-2xh-h^2)}$ iv) $4x+2h-1$