



2. (12 pts) Determine the domain of  $f$  in interval notation if:

$$f(x) = \frac{\sqrt{12x^3 - 8x^2 - x + 1}}{x + \pi}$$

3. (16 pts) If  $f(x) = \frac{x^2}{2-x}$ , find  $f'(x)$

4. (8 pts) Let  $f(x) = \begin{cases} \frac{7x}{2x^2 - c} & \text{if } x \geq 2 \\ cx & \text{if } x < 2 \end{cases}$  and determine all values of  $c$  that will allow  $f$  to be continuous over  $(-\infty, \infty)$

5. (8 pts) Evaluate each of the following limits:

i)  $\lim_{x \rightarrow 2} \frac{|x - 2|}{x^3 - 2x^2}$

ii)  $\lim_{x \rightarrow 2} \frac{x^2 - 5}{(x - 2)^2}$

6. (32 pts) Evaluate each of the following limits:

i)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{\sqrt{x} - \sqrt{2}}$

ii)  $\lim_{x \rightarrow 2} \frac{x - 2}{2x^3 - 3x^2 - 8x + 12}$

iii)  $\lim_{x \rightarrow 0} \frac{\sqrt{x^2 + 3x + 3} - \sqrt{x^2 + x + 3}}{x}$

iv)  $\lim_{x \rightarrow -\infty} \frac{2x + \sqrt{5x^2 + 1}}{3x}$

7. (8 pts) Use our *epsilon-delta* definition of the limit to prove that:

$$\lim_{x \rightarrow 2} (5x^2 - 3x + 1) = 15$$