King Fahd Univ. of Petroleum and Minerals
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MAJOR No. 1
(MATH. 101-041 Sections 4 & 8)

Name:
ID:

Prob. 1
Find the limit

$$\lim_{t\to 1} \frac{t^3 + t^2 - 5t + 1}{t^3 - 3t + 2}$$

Prob. 2

Find

a)

$$\lim_{x \to -\infty} \frac{\sqrt{5x^2 - 2}}{x + 3}$$

b)

$$\lim_{x \to +\infty} \frac{\sqrt{3x^4 + x}}{x^2 - 8}$$

Prob. 3

Use the definition to prove that

$$\lim_{x \to 6} \sqrt{x+3} = 3$$

Prob. 4

Find a value for the constant k that will make the function continuous everywhere

$$f(z) = \begin{cases} kz^2, \ z \leq 2 \\ 2z + k, \ z > 2 \end{cases}$$

Prob. 5

Prove that

$$f(x) = \frac{1}{\sqrt{x^4 + 7x^2 + 1}}$$

is continuous everywhere.

Prob. 6

Use the IVT to show that there is a square with a diagonal length that is between a and $2a$ and an area that is half the area of a circle of radius a.