KEY

Math 125-Quiz 10[1]
September 26, 2011

You have ten minutes to complete this quiz.

1. Suppose that a continuous function $f(x)$ takes on the following values:

$$f(0) = 2, f(1) = -3, f(2) = -2, f(3) = 5, f(4) = 22$$

How many roots (solutions to $f(x) = 0$) does the function have between 0 and 4? Give a smaller interval in which each root is contained.

By the IVT f has at least 2 roots
one between 0 and 1 and another between 2 and 3.

2. Calculate the following limits.

(a)

$$\lim_{x\to\infty} \frac{x+1}{x^2+2x} = \frac{P(x)}{Q(x)}$$

Since $\deg Q(x) > \deg P(x)$, $\lim_{x\to\infty} \frac{x+1}{x^2+2x} = 0$

(b)

$$\lim_{x\to\infty} \frac{x^3-2x}{3x+5x^3} = \frac{P(x)}{Q(x)}$$

Since $\deg P(x) = \deg Q(x)$, look at the ratio of leading coeff's

$$\lim_{x\to\infty} \frac{1x^3+2x}{3x+5x^3} = \frac{1}{5}$$

(c)

$$\lim_{x\to\infty} \frac{2x}{\sqrt{5x^2-2x}} \cdot \frac{\frac{1}{x}}{\frac{1}{x}} = \lim_{x\to\infty} \frac{2}{\sqrt{\frac{5x^2-2x}{x^2}}}$$

again, $P(x)$, $Q(x)$ have the same effective degree $= \lim_{x\to\infty} \frac{2}{\sqrt{5-\frac{2}{x}}} = \frac{2}{\sqrt{5}}$.

[1]You are excused to leave when you're finished with this quiz.