## Quiz 4 for Mathematics 223 Introductory Analysis I - Fall 1999 Material Covered: Section 3.4 of workbook and text For: 22nd October

This is a 15 minute quiz, worth 6% and marked out of 6 points. The total possible points awarded for each question is given in square brackets at the beginning of each question. Anything that can fit on one side of an  $8\frac{1}{2}$  by 11 inch piece of paper may be used as a reference during this quiz. A calculator may also be used. No other aids are permitted.

| $\mathbf{N}$ | ame (please print): ID Number:                                    |
|--------------|---|
|              | last first  |
|              |   |
| 1.           | [2] Consider the function $f(x) = \frac{x^2 - 6x - 4}{3x^2 - 18}$ |
|              | $\lim_{x \to \infty} f(x) = \_$                                   |
|              | $\lim_{x \to -\infty} f(x) = \_$                                  |
|              | $\lim_{x \to -\sqrt{\frac{18}{3}}} f(x) = \underline{\qquad}$     |
|              | $\lim_{x \to \sqrt{\frac{18}{3}}^{-}} f(x) = \_$                  |
| 2.           | [2] The function $\frac{2x+13}{4x^2-2}$ has                       |
|              | vertical asymptote(s) at  |
|              | horizontal asymptote(s) at  |
| 3.           | [2] Identify the extreme points of $f(x) = \frac{4x^2}{x^2+2}$    |
|              | on the closed interval $[-10, 10]$                                |

- **1.** [2]  $\frac{1}{3}$ ;  $\frac{1}{3}$ ;  $\infty$ ;  $\infty$
- 2. [2] vertical:  $4x^2 2 = 0$  at  $x = \pm \frac{1}{\sqrt{2}}$ ; and horizontal: at  $\lim_{x \to \infty} \frac{2x+13}{4x^2-2} = \lim_{x \to \infty} \frac{2x/x^2 + 13/x^2}{4x^2/x^2 - 2/x^2} = \lim_{x \to \infty} \frac{2/x+13/x^2}{4-2/x^2} = 0$
- **3.** [2] minimum is at zero; maxima are at  $\pm 10$