M3550 Intuitive Calculus

Homework I

1 Evaluate the limits

1. $\lim_{x \to 2} x^2 - 3x + 5$
2. $\lim_{x \to 3} \dfrac{1}{3x^2 - 26}$
3. $\lim_{x \to 0} \cos(x) + \sin(x)$
4. $\lim_{x \to \pi} e^x - 3x$
5. $\lim_{x \to 1} \dfrac{\sqrt{x^2 + x + 23} - 5}{x - 1}$

2 Evaluate the limits and graph

1. $\lim_{x \to 0} \dfrac{x^2 - 2x}{x}$
2. $\lim_{x \to 0} \dfrac{x^2 e^x + 3x e^x}{x^2 + 3x}$

3 Problems

1. Using numerical methods, evaluate the limit as x approaches 0 for the following functions: $\frac{\sin(2x)}{x}$, $\frac{\sin(3x)}{x}$, $\frac{\sin(x)}{2x}$, $\frac{\sin(x)}{3x}$ and $\frac{\sin(3x)}{2x}$. Then, postulate a general solution to the problem:

$$\lim_{x \to 0} \frac{\sin(ax)}{bx}$$

2. Evaluate by numerical methods

$$\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x$$