1. (10 points) State the $\epsilon-\delta$ definition of $\lim_{x \to a} f(x) = L$.

2. (10 points) Use the $\epsilon-\delta$ definition to prove

\[ \lim_{x \to 2} -2x + 3 = -1 \]
3. (5 points each) If \( \lim_{x \to a} f(x) = 5 \) and \( \lim_{x \to a} g(x) = -2 \), find each of the following limits:

(a) \( \lim_{x \to a} (f(x)g(x)) \)

(b) \( \lim_{x \to a} (3f(x) - 5g(x)) \)

4. (10 points) What is the maple command to draw the graph of \( f(x) = x^2 \) over the interval \([-2, 2]\)?

5. The graph of \( f \) is shown below.

Use the graph to find the following limits: (3 points each)

(a) \( \lim_{x \to 0} f(x) \)

(b) \( \lim_{x \to 2^-} f(x) \)

(c) \( \lim_{x \to 2^+} f(x) \)

(d) \( \lim_{x \to -2^-} f(x) \)

(e) \( \lim_{x \to -2^+} f(x) \)

(f) \( \lim_{x \to 2} f(x) \)
6. (5 points each) For each of the following, find the indicated limit, or show it does not exist. Be sure to show your computations.

(a) \[ \lim_{x \to 2} \frac{x^2 - 4x + 4}{x^2 + 2x - 8} \]

(b) \[ \lim_{x \to 3} \frac{\sqrt{x + 1} - 2}{x - 3} \]

(c) \[ \lim_{x \to -1} \frac{|x + 1|}{x + 1} \]

(d) \[ \lim_{x \to 3} \frac{x^4 - 81}{x - 3} \]
7. (10 points) Use the squeeze theorem to prove $\lim_{x\to 0} x^2 \cos(2x) = 0$

8. (10 points) Use the intermediate value theorem to show that $2x^3 - 4x^2 + 5x - 4 = 0$ has a solution in the interval $[1, 2]$

9. (10 points extra credit.) Give examples of two functions, $f$ and $g$ so that neither $\lim_{x\to 0} f(x)$ nor $\lim_{x\to 0} g(x)$ exist, but $\lim_{x\to 0} (f(x)g(x))$ does exist.