AP Calc 4.1-4.4 Test Review

1. *Know how to find the limits at ∞ from the 4.4 lesson.

2. State the increasing and decreasing intervals of the function. Then find the x-coordinates of all local extrema. Identify each as a local maximum or local minimum.

a) $f(x) = \sin x + \cos^2 x$ on $[0, 2\pi]$

b) $f(x) = \begin{cases} -x - 18 & x \leq 3 \\ x^2 - 10x & x > 3 \end{cases}$

3. Find all relative extrema, inflection points, where the function is increasing decreasing, and intervals of concavity for each.

a) $f(x) = \dfrac{1}{3}x^3 - x^2 - 3x$ b) $f(x) = x(x-1)^2$ c) $f(x) = x - \sin x$ on $[0, 4\pi]$

d) $f(x) = \dfrac{x}{x^2 + 2}$ on $[-1, 4]$

4. State whether the function satisfies the hypothesis of the Mean Value Theorem on the given interval.
If so, find c that satisfies the conclusion for $f(x) = x^2 - x - 12$ on [-3, 4].

5. Use the graph of f to estimate the values of c that satisfy the conclusion of the mean value theorem on [-2, 2].