Name: _____

1. Class notes for this week: This week we have covered Sections 3.1, 3.2, and 3.3. Next week we will cover Sections 3.4 and 3.5.

2. In this question, we will show the equation $2x + \cos x = 0$ has exactly one real root.

   (a) (1 point) Let $f(x) = 2x + \cos x$. Use the Intermediate Value Theorem to show there is some c such that $f(c) = 0$ in $(-\frac{\pi}{2}, 0)$. Be sure to check all hypotheses of the theorem.

   (b) (1 point) Suppose there is another number d such that $f(d) = 0$. Use Rolles' Theorem to show that there is some e between d and c such that $f'(e) = 0$. Be sure to check all hypotheses of the theorem.

   (c) (1 point) Show that $f'(x)$ is never zero, and use this to conclude that such a d cannot exist. Therefore c is the only root of $2x + \cos x = 0$.

3. (a) (1 point) Let $g(x) = (x+1)^5 - 5x - 2$. Find

- The intervals on which g is increasing and decreasing.
- The local maximum and minimum values of g.
- The intervals on which g is concave up and concave down.
- The inflection points of g.

(b) (1 point) Use your answers to the first part of this problem to sketch a graph of $g(x)$.