This test totals 15 points and you get 25 minutes to do it. Good luck!

1. (a) (2 pts) In the interval $(0, \frac{\pi}{2})$, is $f(x) = \sin x - x$ increasing or decreasing? Explain your answer.

   (b) (1 pt) Using the above, explain why there is no $x$ in $(0, \frac{\pi}{2})$ such that $\sin x = x$.
2. (5 pts) Find all the local maxima and minima for \( f(x) = 5x^3 - 3x^5 \).
(Caution: If \( f''(c) = 0 \), the second derivative test is inconclusive)
3. (5 pts) Find \( \lim_{x \to \infty} \sqrt{x^2 + 9x} - \sqrt{x^2 + 7x} \)
(2 pts) If $f''(x) = 3$ for every $x$ in $(0, \infty)$, explain which of the following graphs $f$ can definitely NOT be?