Free Response Practice #1 Calculator Permitted

Consider the function $h(x) = \frac{-2x-\sin x}{x-1}$ to answer the following questions.

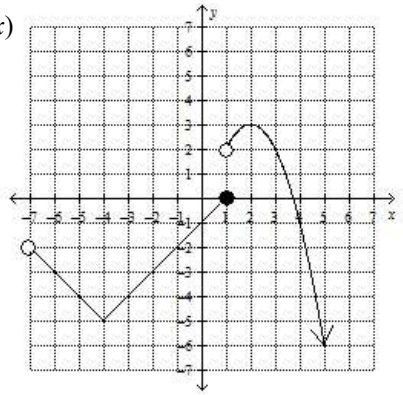
a. Find $\lim_{x\to 1^+} h(x)$. Show your numerical analysis that leads to your answer and explain what this result implies graphically about $h(x)$ at $x = 1$.

b. Find $\lim_{x\to \frac{\pi}{2}} [h(x) \cdot (2x-2)]$. Show your analysis.

c. Explain why the Intermediate Value Theorem guarantees a value of c on the interval [1.5, 2.5] such that $h(c) = -4$. Then, find c.

Free Response Practice #2 Calculator NOT Permitted

Graph of $g(x)$



$$f(x) = \begin{cases} ax + 3, & x < -3 \\ x^2 - 3x, & -3 \le x < 2 \\ bx - 5, & x \ge 2 \end{cases}$$

Pictured above is the graph of a function $g(x)$ and the equation of a piece-wise defined function $f(x)$. Answer the following.

a. Find $\lim_{x \to 1^+} [2g(x) - f(x) \cdot cos\, \pi\, x]$. Show your work applying the properties of limits.

b. On its domain, what is one value of x at which $g(x)$ is discontinuous? Use the three part definition of continuity to explain why $g(x)$ is discontinuous at this value.

c. For what value(s) of a and b, if they exist, would the function $f(x)$ be continuous everywhere? Justify your answer using limits.