2018 AP® CALCULUS AB FREE-RESPONSE QUESTIONS

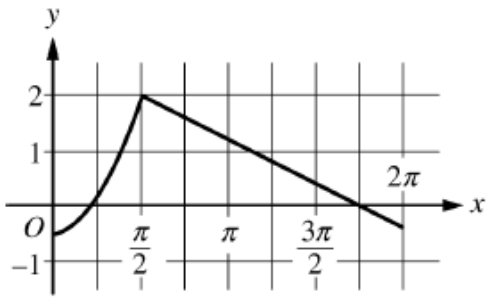
5. Let f be the function defined by $f(x) = e^x \cos x$.

   (a) Find the average rate of change of f on the interval $0 \le x \le \pi$.

   (b) What is the slope of the line tangent to the graph of f at $x = \dfrac{3\pi}{2}$?

   (c) Find the absolute minimum value of f on the interval $0 \le x \le 2\pi$. Justify your answer.

   (d) Let g be a differentiable function such that $g\left(\dfrac{\pi}{2}\right) = 0$. The graph of g', the derivative of g, is shown below. Find the value of $\lim\limits_{x \to \pi/2} \dfrac{f(x)}{g(x)}$ or state that it does not exist. Justify your answer.



Graph of g'