

**AP Free Response Problem of the Day**

**April 25<sup>th</sup> and April 26<sup>th</sup>**

From: [http://www.collegeboard.com/prod\\_downloads/ap/students/calculus/calculus\\_ab\\_frq\\_03.pdf](http://www.collegeboard.com/prod_downloads/ap/students/calculus/calculus_ab_frq_03.pdf)

Let  $f$  be the function defined by

$$f(x) = \begin{cases} \sqrt{x+1} & \text{for } 0 \leq x \leq 3 \\ 5-x & \text{for } 3 < x \leq 5. \end{cases}$$

(a) Is  $f$  continuous at  $x = 3$ ? Explain why or why not.

(b) Find the average value of  $f(x)$  on the closed interval  $0 \leq x \leq 5$ .

(c) Suppose the function  $g$  is defined by

$$g(x) = \begin{cases} k\sqrt{x+1} & \text{for } 0 \leq x \leq 3 \\ mx+2 & \text{for } 3 < x \leq 5, \end{cases}$$

where  $k$  and  $m$  are constants. If  $g$  is differentiable at  $x = 3$ , what are the values of  $k$  and  $m$ ?