Intermediate Value Theorem **Name:**

AP Calculus

1) Let f be a twice differentiable function (which means what it sounds like it means) such that $f(2) = 5$ and $f(5) = 2$. Let $h(x) = f(x) - x$. Explain why there must be a value r for $2 < r < 5$ such that $h(r) = 0$.

x	**0**	**1**	**2**
f(x)	**1**	**k**	**2**

2) The function f is continuous on the closed interval [0, 2] and has values that are given in the table above. The equation $f(x) = \frac{1}{2}$ must have at least two solutions in the interval [0, 2] if $k=$

a) 0 b) ½ c) 1 d) 2 e) 3

Explain your answer:

3) Let f be a function that is differentiable on the open interval (1, 10). If $f(2) = -5,\ f(5) = 5,\ and\ f(9) = -5$ which of the following MUST be true:

I. f has at least 2 zeros.
II. The graph of f has at least one horizontal tangent.
III. For some $c,\ 2 < c < 5,\ f(c) = 3$.

4) Given the values from F(x) in the table below, can we conclude that F(x) = 3? If so, in what interval(s) would this be true? Justify your answer.

x	-1	2	4	7
F(x)	10	0	2	6