Directions: For each function f described in 1-4, first decide whether the IVT & EVT are guaranteed, and then determine whether each lettered statement below "**must** be true" or "**might** be true" and provide justification.

1) *f is a continuous function on a closed interval* $[a, b]$.

	Guaranteed?	Why or why not?
Intermediate Value Theorem (IVT)		
Extreme Value Theorem (EVT)		

Must be true or might be true? Justify your answer.

a. There is a number c in the closed interval $[a, b]$ such that $f(c) \geq f(x)$ for all x in $[a, b]$.

b. There is a number c in the closed interval $[a, b]$ such that $f(c) \leq f(x)$ for all x in $[a, b]$.

c. There is a number c in the closed interval $[a, b]$ such that $f(c) = 0$.

2) *Let f be a function that is continuous on the open interval* $(1,10)$ *with* $f(2) = -5$, $f(5) = 5$,*and* $f(9) = -5$.

	Guaranteed?	Why or why not?
Intermediate Value Theorem (IVT)		
Extreme Value Theorem (EVT)		

Must be true or might be true? Justify your answer.

a. f has at least 2 zeros.

b. For some c, $2 < c < 5$, $f(c) = 3$.

c. The maximum value of f on $(1,10)$ is 5.

x	3	4	5	6	7
$f(x)$	20	17	12	16	20

3) *The function f is continuous on the closed interval* [3,7]. *The table above gives selected values of* f *on this interval.*

	Guaranteed?	Why or why not?
Intermediate Value Theorem (IVT)		
Extreme Value Theorem (EVT)		

Must be true or might be true? Justify your answer.

a. The minimum value of f on [3,7] is 12.

b. There exists c, for $3 < c < 7$, such that $f(c) = 0$.

c. There is a number c in the closed interval [3,7] such that $f(c) \leq f(x)$ for all x in [3,7].

4) *The function* f *is continuous for* $-2 \leq x \leq 1$, $f(-2) = -5$, *and* $f(1) = 4$.

	Guaranteed?	Why or why not?
Intermediate Value Theorem (IVT)		
Extreme Value Theorem (EVT)		

Must be true or might be true? Justify your answer.

a. There exists c, where $-2 < c < 1$, such that $f(c) = 0$.

b. There exists c, where $-2 < c < 1$, such that $f(c) = 3$.

c. There exists c, where $-2 \leq x \leq 1$, such that $f(c) \geq f(x)$ for all x on $-2 \leq x \leq 1$