NAME: $\boxed{\text{KEY}}$

SHEET #171 AND SHEET #181 - QUESTIONS ON IVT AND LIMIT TABLES. Period: ____

CSV CONTINUITY, LIMITS = 1.7, 1.8.

1.7 ADDITIONAL QUESTIONS - 12, 14* page 47.

WITHOUT A CALCULATOR SHOW WHY THERE IS A # c WITH $0 \le c \le 1$ Such that $f(c) = 0$. DO NOT FIND c.

12. $f(x) = e^x - 3x$

$f(0) = e^0 - 3\cdot 0 = 1 - 0 = 1$
$f(1) = e^1 - 3\cdot 1 = e - 3 < 0$, because $e \approx 2.7$
BY IVT, $f(c) = 0$ MUST EXIST FOR SOME c IN $[0, 1]$

14*. $f(x) = 2^x - 1/x$

$f(0)$ = UNDEFINED.
DEFINE SMALLER INTERVAL $0.1 \le c \le 1$.
$f(0.1) = 2^{0.1} - 1/0.1 = 2^{0.1} - 10 < 0$ SINCE $2^{0.1} \approx 1$.
$f(1) = 2^1 - 1/1 = 2 - 1 = 1$
BY IVT, $f(c) = 0$ MUST EXIST FOR SOME c IN $[0.1, 1]$

1.8 ADDITIONAL QUESTIONS = 11, 16, page 55.

USING $Y_1(X)$ ON CALCULATOR, $\boxed{\text{VARS}}$ ▶ Y-VARS ▶ 1:FUNCTION... 1: Y_1

11. a) $f(x) = \sin(2x)/x$

16. a) $f(x) = (x^2 - 9)/(x - 3)$

x	$\sin(2x)/x$	x, $(a = 3)$	x	$(x^2-9)/(x-3)$
-0.1	1.986693308	3 - 0.1	2.9	5.9
-0.01	1.999866669	3 - 0.01	2.99	5.99
-0.001	1.999998667	3 - 0.001	2.999	5.999
-0.0001	1.99999987	3 - 0.0001	2.9999	5.9999
0	UNDEFINED	3	3	UNDEFINED
0.0001	1.999999987	3 + 0.0001	3.0001	6.0001
0.001	1.999998667	3 + 0.001	3.001	6.001
0.01	1.999866669	3 + 0.01	3.01	6.01
0.1	1.986693308	3 + 0.1	3.1	6.1

11.
b) $\lim_{x \to 0} f(x) = \boxed{2}$

d) $\boxed{\delta = 0.09}$ IS SUFFICIENT

e) $\sin(2x)/x = 2[\sin(2x)/2x]$. Let $u = 2x$
$\lim_{x \to 0} f(x) = \lim_{u \to 0} 2[\sin u/u] = 2 \lim_{u \to 0}(\sin(u)/u) = 2 \cdot 1 = 2$.

ANSWER TO 11e ASSUMES $\lim_{x \to 0} \frac{\sin(x)}{x} = \lim_{u \to 0} \frac{\sin(u)}{u} = 1$ WHERE $u = 2x$.

16.
b) $\lim_{x \to 0} f(x) = \boxed{6}$

d) $\boxed{\delta = 0.009}$ IS SUFFICIENT

e) $f(x) = \frac{(x+3)(x-3)}{x-3} = x + 3,\ x \ne 3$.
AS $x \to 3$ $f(x) \to 3 + 3 = 6$.