QUIZ 6

NAME Linda Zhu 3/24/20 SEC________

DUE TUES MARCH 24 AT 6 P.M.

Check the right answer, but show ALL WORK. No credit unless work is shown.

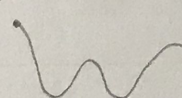
This means to justify your answer with a sketch or the calculus, etc. You may use your notes and book, but not the Internet. Your work MUST BE YOUR OWN. I'm able to discern collaborations.

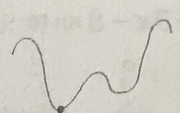
Question 1

		Leading Coefficient +	Leading Coefficient −
Degree	Odd	↙ ↗	↖ ↘
	Even	↖ ↗	↙ ↘

Which of the following is not true?

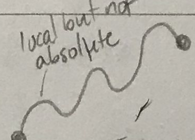
- a. Any even-degree polynomial has at least one absolute extreme on the reals. True
- b. Any odd-degree polynomial has an absolute extreme on the reals. inflection
- c. The absolute extreme of a function can occur at an endpoint. True
- d. A local minimum can also be an absolute minimum. True

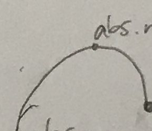




Question 2

If a function is continuous on a closed interval [a, b], then...

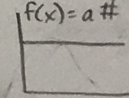


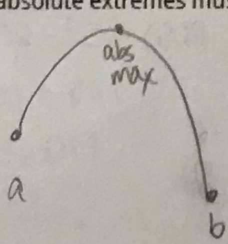


- a. Any local extreme will also be an absolute extreme. False
- b. It will have both an absolute maximum and an absolute minimum on [a, b]. True
- c. It cannot have the same absolute maximum value and absolute minimum value. False
- d. The absolute extremes must occur at x = a and x = b. False

a closed interval must have a max or min, endpts can be extrema

$f(x) = a\ \#$ is both max & min value is same





$\log_e x =$ $\quad e^{?} = x$ $\quad \log_2 8 = 3$

$2^3 = 8$

$\ln x = ?$

Question 3

The absolute minimum of $f(x) = \ln(x+2)$ on $[-1, \infty)$ is:

$f'(x) = \frac{1}{x+2} \cdot 1$

- a. x = -1
- b. x = 0
- c. Nowhere
- d. x = -2

$f'(x) = \frac{1}{x+2} = 0$

$1 \neq 0$

$x + 2 = 0$

~~$x = -2$ cnt #~~

Not in the interval

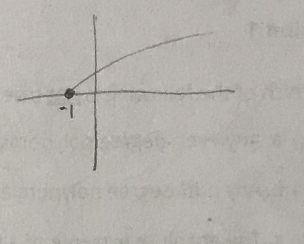
$f(-1) = \ln(-1+2)$

$\ln(1)$

$= 0$

$e^{?} = 1$

$e^{0} = 1$



Question 4

The absolute maximum of $f(x) = x^3 - 6x^2 + 9x - 8$ on [0, 5] occurs at:

$f'(x) = 3x^2 - 12x + 9$

$3(x^2 - 4x + 3)$

$0 = 3(x-3)(x-1)$

$0 \neq 3 \quad x - 3 = 0 \quad x - 1 = 0$

$x = 3 \quad x = 1$ cnt. #s

- a. x = 5
- b. x = 1
- c. x = 0
- d. x = 3

$f(3) = 3^3 - 6(3)^2 + 9(3) - 8$

$27 - 54 + 27 - 8$

$54 - 62$

$f(3) = -8$

$f(1) = 1^3 - 6(1)^2 + 9(1) - 8$

$1 - 6 + 9 - 8$

$10 - 14$

$f(1) = -4$

$f(0) = 0^3 - 6(0)^2 + 9(0) - 8$

-8

$f(5) = 5^3 - 6(5)^2 + 9(5) - 8$

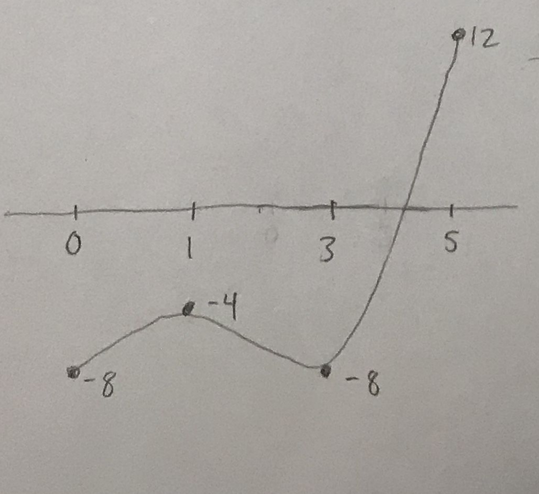
$125 - 150 + 45 - 8$

$170 - 158$

12

$25 \times 5 = 125$

$25 \times 6 = 150$



Question 5

Which function has no extremes on the stated domain?

a. $y = \dfrac{x+1}{x-1}$ on [2, 6]

b. $f(x) = \begin{cases} x+3, \text{ for } x<0 \\ 5, \text{ for } x \geq 0 \end{cases}$

c. $y = -x^4$ on the reals

d. $y = e^x$ on the reals

(a)

$y = \dfrac{x+1}{x-1}$ $\quad y' = \dfrac{(x-1)-(x+1)}{(x-1)^2}$ $\quad x-1-x-1$ $\quad y' = \dfrac{-2}{(x-1)^2} = 0$

$-2 \neq 0$

$\sqrt{(x-1)^2} = \sqrt{0}$

$x-1=0$

~~x = 1 crit #~~

not in domain

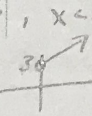
$f(2) = \dfrac{2+1}{2-1} = \dfrac{3}{1} = 3$

$f(6) = \dfrac{6+1}{6-1} = \dfrac{7}{5}$

yes extremas @endpts.

(b) $f(x) = x+3$, $x<0$

$f'(x) = 1 \neq 0$ $\quad 3$ no extrema

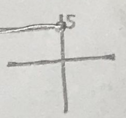


$f(x) = 5$ $\quad x \geq 0$

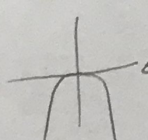
$f'(x) = 0 = 0$ $\quad 5$ extrema @ $x=0$

crit # at 0

$f(0) = 5$



(c) $y = -x^4$



extrema here

(d) $y = e^x$

$y' = e^x = 0$

cannot happen

no critical #'s

so slope never equals 0 & no extrema