

What day of the month is your birthday ?

What are the last 2 digits of your address ?

What are the last 2 digits of your zip code ?

What are the last 2 digits of your social security number ?

[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER,

USE YOUR STUDENT ID NUMBER]

CALCULATOR NOT ALLOWED ON THIS SECTION

State the Intermediate Value Theorem.

SCORE: ____ / 6 POINTS

SEE OTHER KEY

Complete the precise definition of a limit:

SEE OTHER KEY

SCORE: ____ / 8 POINTS

 $\lim_{x \rightarrow a} f(x) = L$ if _____Suppose that the size of the pupil (in millimeters) of a certain animal is given by $f(x) = \frac{72x^{-0.4} + 48}{3x^{-0.4} + 8}$,

SCORE: ____ / 8 POINTS

where x is the intensity of the light on the pupil. Find the size of the pupil as the light fades to nothing. Show all algebraic work.

$$\begin{aligned}
 \lim_{x \rightarrow 0^+} \frac{72x^{-0.4} + 48}{3x^{-0.4} + 8} &= \lim_{x \rightarrow 0^+} \frac{72x^{-0.4} + 48}{3x^{-0.4} + 8} \cdot \frac{x^{0.4}}{x^{0.4}} \\
 &= \lim_{x \rightarrow 0^+} \frac{72 + 48x^{0.4}}{3 + 8x^{0.4}} \\
 &= \frac{72 + 0}{3 + 0} \\
 &= 24 \text{ mm}
 \end{aligned}$$

Evaluate the following limits. Your answer should be a number, $+\infty$, $-\infty$ or "DNE" (if the other answers do not apply). **Show all relevant work as demonstrated in class. If an answer is "DNE", explain briefly.** SCORE: ____ / 36 POINTS

$$\lim_{x \rightarrow -\infty} \arctan(1 - e^x)$$

$$\lim_{x \rightarrow 2} \frac{6 - 3x}{5 - \sqrt{9x + 7}}$$

SEE

$$\lim_{x \rightarrow 1} \frac{x^2 - 5x - 4}{x^2 - 4x - 3}$$

$$\lim_{x \rightarrow 3^-} f(x) \text{ where } f(x) = \begin{cases} 2x - 7 & \text{if } x < 1 \\ 5 - 3x & \text{if } 1 < x < 4 \\ x + 2 & \text{if } x > 4 \end{cases}$$

OTHER

$$\lim_{x \rightarrow \infty} \tan(\ln x)$$

$$\lim_{x \rightarrow -5} \frac{x + 5}{\frac{6}{x + 7} - 3}$$

KEY

Determine the intervals on which $f(x) = \sqrt{x^2 - 4}$ is continuous. Show all algebraic work.

SCORE: ____ / 8 POINTS

SEE OTHER KEY

Find all vertical asymptotes of $f(x) = \frac{1-x}{9-6x+x^2}$. For each vertical asymptote, determine whether $f(x) \rightarrow \infty$ or $f(x) \rightarrow -\infty$ on each side of the asymptote. Show all relevant work.

SCORE: ____ / 12 POINTS

$$f(x) = \frac{1-x}{(x-3)^2}$$

$$(x-3)^2 = 0$$
$$x = 3$$

$$\lim_{x \rightarrow 3^-} \frac{1-x}{(x-3)^2} = -\infty$$
$$\frac{-2}{0^+}$$

$$\lim_{x \rightarrow 3^+} \frac{1-x}{(x-3)^2} = -\infty$$
$$\frac{-2}{0^+}$$