Name: _____

Clear your desk of everything except pens, pencils and erasers. Show all work clearly and in order. No notes, phones and calculators. You have 10 minutes to finish the test for 10 points.

    The last one on the back worth two extra points. Maximum of 10 points will be recorded for each quiz.

1. **(2 points)** A particle moves according to the law of motion

$$s(t) = -2t^2 + 3t, \ t > 0$$

    where t is measured in seconds and s in feet. Find the average velocity over the interval $[0, 2]$.

$$\text{Ave. Vel.} = \frac{S(2) - S(0)}{2 - 0} = \frac{-2 \cdot 2^2 + 3 \cdot 2 - 0}{2}$$

$$= \frac{-8 + 6}{2}$$

$$= \frac{-2}{2} = \boxed{-1 \ ft/s}$$

2. Compute the following limits (a finite number, $+\infty$ or $-\infty$) where

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

    (a) **(2 points)**

$$\lim_{x \to 4} f(x) = \lim_{x \to 4} \frac{1}{x-2} \xrightarrow{\text{Plug in}} \frac{1}{4-2} = \boxed{\frac{1}{2}}$$

    (b) **(2 points)**

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} \frac{1}{x-2} \xrightarrow{\text{Plug in}} \frac{1}{2-2} = \frac{1}{0} = \infty$$

then check $\pm$.

$$\xrightarrow[2]{x \to} \text{left} . \quad x-2 < 0 \ (\text{or plug in } x=1)$$

$$\frac{1}{1-2} = \frac{1}{-1} < 0$$

therefore, $\boxed{\lim_{x \to 2^-} \frac{1}{x-2} = -\infty}$

3. (4 points) Compute the limit (a finite number, $+\infty$ or $-\infty$):

$$\lim_{x \to -2^-} \frac{1-x}{x^2(x+2)}$$

Plug X=-2 in

$$\frac{1-(-2)}{(-2)^2 \cdot (-2+2)} = \frac{+3}{+4 \cdot 0} = \infty$$

then check $\pm$.

$x \to -2^-$ $\xrightarrow{\quad x \to \quad}$ left $X+2 < 0$ or Plug X=-3 in. $\frac{1-(-3)}{(-3)^2 \cdot (-3+2)} = \frac{4}{9 \cdot (-1)} < 0$

$$\lim_{x \to -2^-} \frac{1-X}{X^2 \cdot (X+2)} = -\infty$$

(Extra 2 pts⋆) Find all the vertical asymptotes of

$$y = \frac{1-x}{x^2(x+2)}$$

(Two extra points for the vertical asymptotes, maximum of 10 points will be recorded.)

Vertical asymptotes : let denominator = 0

$\Longrightarrow X^2 \cdot (X+2) = 0$

$\Longrightarrow X = 0$ or $X+2 = 0$

Equations for V.A. : $\boxed{X = 0}$ and $\boxed{X = -2}$

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