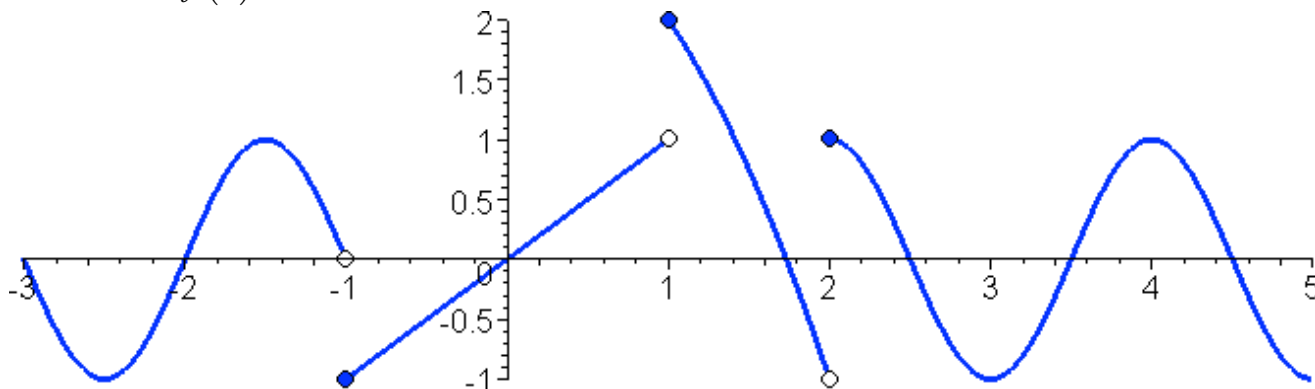


Part I: Multiple Choice, Put your **CAPITAL LETTER** answer choice in the blank to the left of the number.

Use the graph of $f(x)$ below for $-3 \leq x \leq 5$ to answer questions 1- 5.



B 1. $\lim_{x \rightarrow -1^-} f(x) =$ (A) -1 (B) 0 (C) 1 (D) 2 (E) DNE

C 2. $f(x)$ is monotonic/strictly decreasing on which of the following given intervals?
(A) $(-3, -2)$ (B) $(-1, 2)$ (C) $(1, 2)$ (D) $(3, 5)$ (E) $(3, 4)$

B 3. $\lim_{x \rightarrow 0} f(x) =$ (A) -1 (B) 0 (C) 2 (D) DNE (E) $-\infty$

A 4. $f(x)$ has a relative/local maximum of
(A) 1 (B) -1 (C) 3 (D) 4 (E) $f(x)$ has no relative/local maximum

C 5. Which of the following is NOT true about the graph of $f(x)$?
(A) $f(x)$ is continuous at $x = -2$ (B) $\lim_{x \rightarrow -1^+} f(x) = f(-1)$ (C) $\lim_{x \rightarrow 2^-} f(x) = DNE$
(D) $f(x)$ has a non-removable discontinuity at $x = 1$. (E) $f(x)$ has a local min of -1.

D 6. If $h(x) = 2\sqrt{x-3}$, find the average rate of change of $h(x)$ on the interval $x \in [19, 28]$.
(A) $\frac{1}{9}$ (B) $\frac{9}{2}$ (C) $\frac{-9}{2}$ (D) $\frac{2}{9}$ (E) $-\frac{2}{9}$ $\frac{10-9}{9}$

C 7. $\lim_{x \rightarrow \infty} \frac{400000 + 700000x^3 + 200000x^2 + 500000x}{x^{13} - 100000x^{40}} =$
(A) 400000 (B) -4 (C) 0 (D) 700000 (E) ∞

Part II: Free Response

Show all work BELOW THE LINE. No credit will be given for any work done above the line. Label each part, use proper notation, and box your final answers. Remember that on this section, your **PROCESS** is as important as your **PRODUCT**.

Given

$$f(x) = -2x^2 - 4x + 30 \quad g(x) = 40 + 13x + x^2 \quad k(x) = 5x^7 - 4x^5 + x^3 - 12x \quad p(x) = -9x^6 - 7x^4 + 15$$

8. Let $h(x) = \frac{g(x)}{f(x)}$

B
C
B
A
C
D
C

(a) Find the domain of $h(x)$.

(b) Find the **equation** of any vertical asymptote of $h(x)$.

(c) Find the **coordinate**, (x, y) , of any removable point discontinuity of $h(x)$.

(d) Find the **equation** of any horizontal asymptote of $h(x)$.

9. Let $m(x) = \frac{k(x)}{p(x)}$

(e) Is $m(x)$ even, odd, or neither. Justify.

(f) Find $\lim_{x \rightarrow \infty} m(x)$

(g) Find the y-intercept of $m(x)$. List it as an ordered pair.

⑧ $h(x) = \frac{x^2 + 13x + 40}{-2x^2 - 4x + 30}$

(a) $h(x) = \frac{(x+5)(x+8)}{-2(x^2 + 2x - 15)}$

$h(x) = \frac{(x+5)(x+8)}{-2(x+5)(x-3)}$

$D_h: \{x \mid x \neq -5, 3\}$
① ②

(b) VA @ $x = 3$ ③

(c) Hole @ $(-5, \frac{3}{16})$
④ ⑤

(d) HA @ $y = -\frac{1}{2}$
⑥

⑨ $m(x) = \frac{5x^7 - 4x^5 + x^3 - 12x}{-9x^6 - 7x^4 + 15}$

(e) $m(x)$ is odd ⑦ since $m(-x) = -m(x)$ ⑧

(f) $\lim_{x \rightarrow \infty} m(x) = -\infty$ ⑨ OR DNE

(g) $m(0) = \frac{0}{15} = 0$, y-int: $(0, 0)$ ⑩
10 checks on F.R.

17 checks
TOTAL