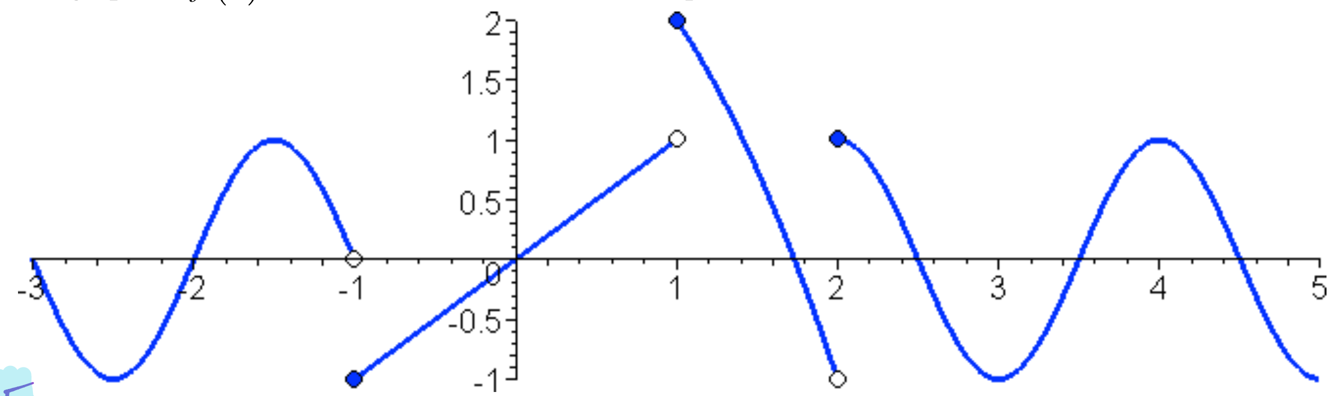
Name____ Date_______________________ Period_______

PreAP Precalculus

TEST Chapter 2.1-2.3, Form A. No Calculator

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 $-3 \le x \le 5$ to answer questions 1- 5.



__E__ 1. $\lim\limits_{x \to -1} f(x) =$ DNE

$\lim\limits_{x \to -1^-} f(x) = 0$, $\lim\limits_{x \to -1^+} f(x) = -1$, $0 \neq -1$

(A) -1 (B) 0 (C) 1 (D) 2 (E) DNE

__D__ 2. $f(x)$ is monotonic/strictly increasing on which of the following given intervals? x

(A) $(-3,-2)$ dwn & up (B) $(-1,2)$ up & down (C) $(1,2)$ dwn (D) $(3,4)$ up (E) $(-2,-1)$ up & dwn

__B__ 3. $f(x)$ has a relative/local minimum of (y-value in a valley)

(A) 5 (B) -1 (C) 3 (D) 2 (E) $f(x)$ has no relative/local minimum

__A__ 4. $f(x)$ has a relative/local maximum at (x-value of a hill)

(A) 1 (B) -1 (C) 3 (D) -2 (E) $f(x)$ has no relative/local maximum

__E__ 5. Which of the following is NOT true about the graph of $f(x)$?

(A) $f(x)$ is continuous at $x = 0$ (B) $\lim\limits_{x \to 2^-} f(x) = f(-1)$ (C) $\lim\limits_{x \to 1} f(x) = DNE$

(D) $f(x)$ has a local max of 2. (E) $f(x)$ has a local min of -1 at 2.

E 6. If $h(x)=2x^2+5$, find the average rate of change of $h(x)$ on the interval $x\in[-1,3]$.

(A) $\frac{21}{4}$ (B) $\frac{17}{4}$ (C) 8 (D) 5 (E) 4

$$\text{Avg}=\frac{h(3)-h(-1)}{3-(-1)}=\frac{(18+5)-(2+5)}{4}=\frac{23-7}{4}=\frac{16}{4}=4$$

E 7. $\lim_{x\to\infty}\frac{333+4444x^{4444}+555x^{555}}{111x^{555}+222x^{444}+333}=$ $4444>555$

(A) 555 (B) 5 (C) 0 (D) 3 (E) ∞

E 8. Which of the following **is true** about $f(x)=\frac{2x^2-15x-8}{x^3-7x^2-8x}$

(A) $f(x)$ has a vertical asymptote at $x=8$

(B) $f(x)$ is an odd function $\frac{N}{N}=N$

(C) $\lim_{x\to-\infty}f(x)=\cancel{\infty}$ 0

(D) $f(x)$ has a hole at $\left(8,\frac{11}{72}\right)$

(E) $f(x)$ has horizontal asymptote at $y=0$

$\lim_{x\to\infty}f(x)=\frac{2x^2+\cdots}{x^3+\cdots}$

$x=8$ is not even a root of the denominator

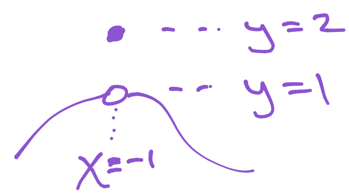
$8^3-7(8^2)-8=512-448-8=56\neq0$

B 9. The function $f(x)=\begin{cases}3x+4, & x<-1\\ 2 & ,x=-1\\ 2x^2-1, & x>-1\end{cases}$

$\lim_{x\to-1^-}f(x)=1$

$f(-1)=2$

$\lim_{x\to-1^+}f(x)=1$



(A) has a jump at $x=-1$ (B) has a hole at $x=-1$ (C) has a VA at $x=-1$

(D) is continuous at $x=-1$ (E) is an even function

Part II: Free Response

Show all work in the space provided. Use proper notation and show all steps. Remember that on this section, your PROCESS is as important as your PRODUCT.

Given

$f(x)=2x^2-2x-24 \quad g(x)=x^2+3x-28 \quad k(x)=3x^9-7x^5+x^3-2x \quad p(x)=-2x^6+8x^4+1$

10. Let $h(x)=\dfrac{g(x)}{f(x)} = \dfrac{x^2+3x-28}{2x^2-2x-24}$

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

$h(x) = \dfrac{(x+7)(x-4)}{2(x^2-x-12)}$

$h(x) = \dfrac{(x+7)(x-4)}{2(x+3)(x-4)}$

$D_h: \{x \mid x \neq -3, 4\}$ √1 √2

or

$D_h: (-\infty,-3)\cup(-3,4)\cup(4,\infty)$

* Lose 1 check if poor notation

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

$h(x) = \dfrac{(x+7)\cancel{(x-4)}}{2(x+3)\cancel{(x-4)}}$

VA @ $x=-3$ √3

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

Hole @ $\left(4, \dfrac{11}{14}\right)$ √4 √5

$h(x) = \dfrac{(x+7)}{2(x+3)}, x \neq 4$

when $x=4$: $h(4) = \dfrac{4+7}{2(4+3)} = \dfrac{11}{14}$

So, $\lim\limits_{x\to 4} h(x) = \dfrac{11}{14}$

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

$h(x) = \dfrac{x^2+3x-28}{2x^2-2x-24}$

$\lim\limits_{x\to\infty} h(x) = \lim\limits_{x\to\infty} \dfrac{1\cancel{x^2}+\cdots}{2\cancel{x^2}+\cdots} = \dfrac{1}{2}$

So, $h(x)$ has a HA @ $y=\frac{1}{2}$ √6

(e) Find the **coordinate**, (x, y), of any x-intercepts of $h(x)$.

*Holes cannot be x-ints, so use the $h(x)$ version w/o the HOLE factor.

$h(x) = \dfrac{(x+7)}{2(x+3)}, x \neq 4$

$h(x)=0$

$\dfrac{x+7}{2(x+3)} = 0$

when $x+7=0$

when $x=-7$

So, $h(x)$ has an x-intercept @ $(-7, 0)$ √7

11. Let $m(x)=\frac{k(x)}{p(x)} = \frac{3x^9-7x^5+x^3-2x}{-2x^6+8x^4+1}$

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

$m(x) = \frac{\text{ODD}}{\text{EVEN}} = \text{ODD}$ ✓8

So, $m(x)$ is an odd function

(b) Find $\lim_{x\to\infty} m(x)$

$m(x) = \frac{3x^9-7x^5+x^3-2x}{-2x^6+8x^4+1}$

$\lim_{x\to\infty} \frac{3x^9+\cdots}{-2x^6+\cdots} = -\infty$ ✓9

Since $9>6 \to \pm\infty$

and $\frac{3(+)^9}{-2(+)^6} = \frac{+}{-} = -$

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

$m(x) = \frac{3x^9-7x^5+x^3-2x}{-2x^6+8x^4+1}$

$m(0) = \frac{0}{1} = 0$

So, $m(x)$ has a y-intercept @

$(0,0)$ ✓10