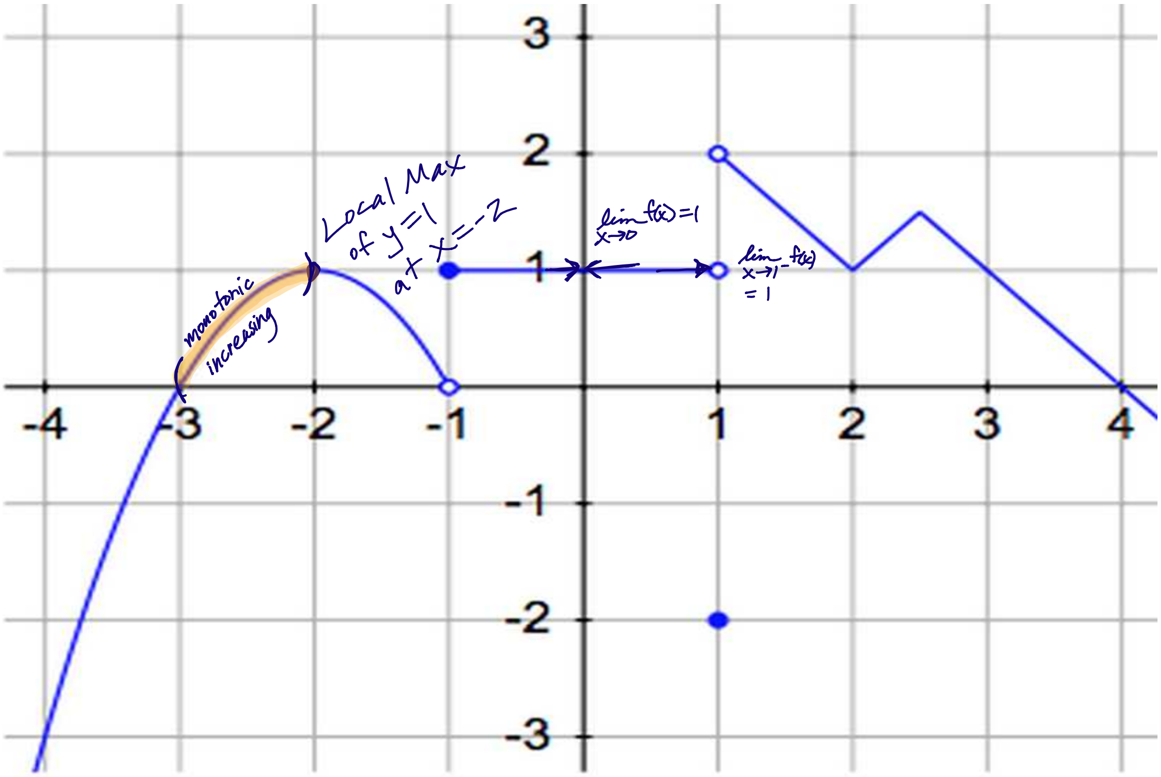
Name KEY Date Tuesday, 10-16-2018 Period________

PreAP Precalculus

TEST Chapter 2.1-2.3 + Inverse, Form A. **No Calculator** 18 checks TOTAL

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 $-4 \le x \le 4$ to answer questions 1- 4.



D 1. $f(x)$ has a local (relative) maximum of ← y-value

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

A 2. $\lim_{x\to 0} f(x) =$

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

B 3. $\lim_{x\to 1^-} f(x) =$

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

E 4. $f(x)$ is monotonic (strictly) increasing on which of the following given intervals?

(A) $(2,4)$ (B) $(-1,1)$ (C) $(2,3)$ (D) $(1,2)$ (E) $(-3,-2)$

A 5. If $A(x) = 5\sqrt{2x+1}$, find the average rate of change of $A(x)$ on the interval $x \in [4,12]$.

(A) $\frac{5}{4}$ (B) $-\frac{5}{4}$ (C) $\frac{4}{5}$ (D) $-\frac{4}{5}$ (E) $\frac{1}{8}$

Avg RoC $= \frac{A(12) - A(4)}{12 - 4}$

$= \frac{5(5) - 5(3)}{8}$

$= \frac{25-15}{8}$

$= \frac{10}{8}$

$= \frac{5}{4}$

D 6. If $f(x)=\dfrac{5x-1}{3-2x}$, what is the domain of $f^{-1}(x)$ = Range of f(x), the inverse of f?

(A) $D_{f^{-1}}:\left(-\infty,\frac{5}{3}\right)\cup\left(\frac{5}{3},\infty\right)$ (B) $D_{f^{-1}}:\left(-\infty,\frac{3}{2}\right)\cup\left(\frac{3}{2},\infty\right)$ (C) $D_{f^{-1}}:\left(-\infty,-\frac{3}{2}\right)\cup\left(-\frac{3}{2},\infty\right)$

(D) $D_{f^{-1}}:\left(-\infty,-\frac{5}{2}\right)\cup\left(-\frac{5}{2},\infty\right)$ (E) $D_{f^{-1}}:\left(-\infty,\frac{2}{3}\right)\cup\left(\frac{2}{3},\infty\right)$

$\lim_{x\to\infty} f(x)=\frac{5}{-2}$

so, f has a HA @ $y=-\frac{5}{2}$

$R_f:\{y\mid y\neq -\frac{5}{2}\}$ so $D_{f^{-1}}:\{x\mid x\neq -\frac{5}{2}\}$

C 7. $\lim\limits_{x\to\infty}\dfrac{222x^{222}-22x^{22}+2}{3x^3+33x^{33}-333x^{333}}=$

(A) $\dfrac{222}{-333}$ (B) $\dfrac{222}{3}$ (C) 0 (D) $-\infty$ (E) ∞

$\sim \lim\limits_{x\to\infty}\dfrac{222x^{222}+\cdots}{-333x^{333}+\cdots}=0$

Since $333>222$ (exponents)

C 8. Which of the following is **NOT** (FALSE) true about $f(x)=\dfrac{(x+5)(x-3)(x+1)}{x^2-3x-40}=\dfrac{\cancel{(x+5)}(x-3)(x+1)}{\cancel{(x+5)}(x-8)}$

x-intercepts @ $x=3$, $x=-1$

f has a Hole at $\left(-5,\frac{(-8)(-4)}{(-13)}\right)$ $\left(-5,-\frac{32}{13}\right)$

(A) $f(x)$ has a vertical asymptote at $x=8$ ✓ (B) $f(x)$ has a hole at $\left(-5,\dfrac{-32}{13}\right)$ ✓ (C) $\lim\limits_{x\to-\infty} f(x)=\infty$ should be $-\infty$

(D) $f(x)$ has an x-intercept $x=-1$ ✓ (E) $f(x)$ has an x-intercept $x=3$ ✓

$f(x)=\dfrac{x^3+\cdots}{x^2-3x-40}$ other terms don't matter for end-behavior

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

D 9. The function $g(x)=\begin{cases}x^2-8, & x<-2\\ -4, & x=-2\\ 5-\sqrt{x^3+89}, & x>-2\end{cases}$

(A) has a jump at $x=-2$ (B) has a hole at $x=-2$ (C) has a vertical asymptote at $x=-2$

(D) is continuous at $x=-2$ (E) has a horizontal asymptote at $y=5$

$\lim\limits_{x\to-2^-} g(x)$

$\lim\limits_{x\to-2^-}(x^2-8)$

$4-8$

-4

$g(-2)$

-4

$\lim\limits_{x\to-2^+} g(x)$

$\lim\limits_{x\to-2^+}\left(5-\sqrt{x^3+89}\right)$

$5-\sqrt{-8+89}$

$5-\sqrt{81}$

$5-9$

-4

Since $-4=-4=-4$,

g(x) is continuous at $x=-2$

Part II: Free Response
Show all work in the space provided. As always, use proper notation, and show the work that leads to your answer. Remember that on this section, your PROCESS is as important as your PRODUCT. Given

$P(x) = 3x^2 - 2x - 8 \qquad T(x) = 2x^2 + 3x^4 - 4x^6 + 5x^8 \qquad R(x) = x^2 + 3x - 10 \qquad V(x) = -9x^5 + 8x^3 + 7x + 6$

10. Let $Z(x) = \dfrac{P(x)}{R(x)}$

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

$$Z(x) = \frac{3x^2 - 2x - 8}{x^2 + 3x - 10}$$

$$Z(x) = \frac{(3x+4)(x-2)}{(x+5)(x-2)}$$

$D_Z: \{x \mid x \neq -5, 2\}$ or $D_Z: (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

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

$$Z(x) = \frac{(3x+4)\cancel{(x-2)}}{(x+5)\cancel{(x-2)}}$$

$Z(x)$ has a VA @ $x = -5$

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

$$Z(x) = \frac{3x+4}{x+5}, \ x \neq 2$$

$Z(x)$ has a hole at $\left(2, \frac{10}{7}\right)$

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

$$Z(x) = \frac{3x^2 - 2x - 8}{1x^2 + 3x - 10}$$

$Z(x)$ has a HA at $y = 3$

(e) Find the **coordinate(s)**, (x, y), of any x-intercept(s) of $Z(x)$.

$$Z(x) = \frac{3x+4}{x+5}, \ x \neq 2$$

$Z(x) = 0$

$\dfrac{3x+4}{x+5} = 0$

when $3x + 4 = 0$

$x = -\frac{4}{3}$

$Z(x)$ has an x-intercept at $\left(-\frac{4}{3}, 0\right)$

11. Let $N(x) = \dfrac{T(x)}{V(x)}$

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

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

constants ruin origin symmetry! (sign doesn't change)

$$= \frac{E}{N}$$

$$= N$$

So, $N(x)$ is neither even nor odd

√7 with some justification

(b) $\lim_{x \to -\infty} N(x) =$

$$\lim_{x \to -\infty} \frac{2x^2 + 3x^4 - 4x^6 + 5x^8}{-9x^5 + 8x^3 + 7x + 6}$$

$$\lim_{x \to -\infty} \frac{5x^8 + \cdots}{-9x^5 + \cdots}$$

$+\infty$ (or DNE)

√8

(c) Find the coordinate, (x, y), of the y-intercept of $N(x)$.

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

$$N(0) = \frac{0}{6}$$

$$= 0$$

So, $N(x)$ has a y-intercept at $(0, 0)$

√9

(the origin)

9 checks on FR