Name_____ Date_____ Period_____

HPC TEST: Chapter 2.1-2.2 Form A **NO CALCULATOR**
No Calculator

Part I: Multiple Choice. Put the CAPITAL letter in each blank to the left of the problem number.

____ 1. The domain of $f(x)=\dfrac{3\sqrt{4+2x}}{x^2-x-6}$ is D_f:

(A) $[-2,\infty)$ (B) $(-\infty,-2)\cup(-2,3)\cup(3,\infty)$ (C) $(-2,\infty)$ (D) $(-2,3)\cup(3,\infty)$ (E) $[3,\infty)$

____ 2. Find the domain of $h(x)=\dfrac{\sqrt{x+9}}{\sqrt{x}-1}$. D_h:

(A) $\{x|x\neq 0,1\}$ (B) $\{x|x\geq 0, x\neq 1\}$ (C) $\{x|x\geq -9, x\neq 1\}$ (D) $\{x|x\geq 0\}$ (E) $\{x|x\geq -9, x\neq 0\}$

____ 3. Which of the following is the **equation** of **an** asymptote on the graph of $f(x)=\dfrac{8x^2-72}{2x^2-4x-30}$?

(A) $x=5$ (B) $x=4$ (C) $x=-3$ (D) $x=3$ (E) $y=5$

____ 4. What is the domain of $h(x)=\dfrac{3}{\sqrt{-(2x+3)(x-4)}}$?

(A) $\left[-\frac{3}{2},4\right]$ (B) $\left(-\infty,-\frac{3}{2}\right]\cup[4,\infty)$ (C) $[4,\infty)$ (D) $\left[-\frac{3}{2},\infty\right)$, (E) $\left(-\frac{3}{2},4\right)$

____ 5. If $f(x)=\dfrac{3x^2-4x^4+6x^3}{3x^3-2x^4+8x-3x^2}$, find $\lim\limits_{x\to\infty} f(x)$

(A) 0 (B) 1 (C) 2 (D) ∞ (E) $-\infty$

____ 6. The function $f(x)=\dfrac{x(x+1)(x-2)(x+3)(x-4)}{(x-1)(x-2)(x+3)(x+4)}$ has a removable point discontinuity at

(A) $(2,5)$ (B) $(-3,21)$ (C) $(3,-5)$ (D) $(2,-2)$ (E) None of these

____ 7. If $f(x)=\dfrac{2x^2-5}{5x^5+2x^2-5}$, find $\lim\limits_{x\to-\infty} f(x)$

(A) 0 (B) 1 (C) 2 (D) ∞ (E) $-\infty$

____ 8. Which of the following statements is NOT TRUE about the function $f(x) = \frac{x^2-6x-16}{x^2-x-6}$?

(A) The function a removable point discontinuity at (-2,2)
(B) The function has a horizontal asymptote at $y = 1$.
(C) The function has a vertical asymptote at x = 3
(D) The domain of the function is $\{x|x \neq -2,3\}$
(E) $\lim_{x\to\infty} f(x) = \infty$

____ 9. Which of the following regarding $f(x)$ are true if

$$f(x) = \begin{cases} x - 5 & x < -7 \\ -110 & x = -7 \\ -61 + x^2 & x > -7 \end{cases}$$

I. $\lim_{x\to -7^+} f(x) = f(-7)$ II. $\lim_{x\to -7^-} f(x) = \lim_{x\to -7^+} f(x)$ III. $f(8) = 3$

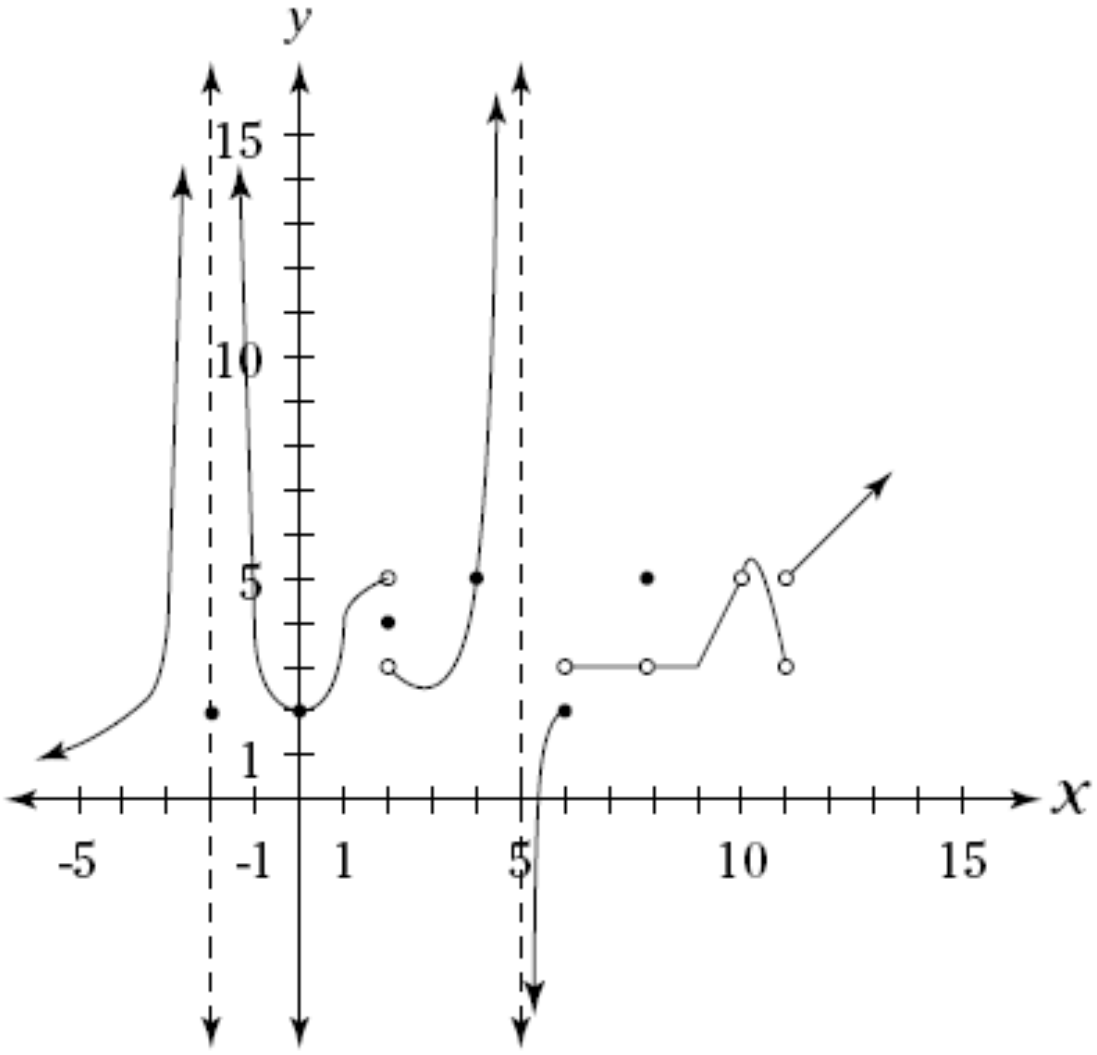
(A) I only (B) II only (C) III only (D) I & II only (E) II & III only (F) I, II & III

Part II: Free Response
Show all work BELOW THE LINE. No credit will be given for anything written above the line on each problem.

10. For the equation below
   (a) Sketch the following piecewise function. Be sure to label the axes at points where the graph changes, show all asymptotes, and clearly show open vs. closed circles.
   (b) Using the 3-step definition of continuity at a point, determine if the function is continuous at $x = 0$.

$$f(x) = \begin{cases} 3 - x^2, & x \le 0 \\ 2, & 0 < x < 5 \\ \sqrt{x-1}, & x > 5 \end{cases}$$

11. Given the graph of the following piecewise function $f(x)$, answer the questions that follow.



(a) $\lim_{x \to -2} f(x) =$

(b) $\lim_{x \to 2^+} f(x) =$

(c) $f(6) =$

(d) $\lim_{x \to 8} f(x) =$

(e) $\lim_{x \to 9^-} f(x) =$

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