PreAP Precalculus
TEST Chapter 3.1, 3.2, and 3.4 Form A. No Calculator Permitted

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

_____ 1. Let *R, S, T,* and *V* be the roots of $f(x) = 2x^4 - 17x^3 + 6x^2 + 17x - 8$. If $f(1) = 0 = f(8)$, find the product *RSTV*.

$\quad$ (A) 24 $\qquad$ (B) −8 $\qquad$ (C) 8 $\qquad$ (D) 4 $\qquad$ (E) −4

_____ 2. Simplify: $i^{487} =$

$\quad$ (A) i $\qquad$ (B) −1 $\qquad$ (C) 1 $\qquad$ (D) $-i$ $\qquad$ (E) 0

_____ 3. Which of the following MUST be true about a polynomial function of even degree?

$\quad$ (A) It is an even function $\qquad$ (B) It has no real solutions $\qquad$ (C) It has an odd number of complex roots
$\qquad$ (D) It has at least one irrational root $\qquad$ (E) It has an odd number of relative extrema

_____ 4. If $x + 1$ is a factor of $f(x) = x^3 - x^2 - 10x - 8$, which of the following is another factor of $f(x)$?
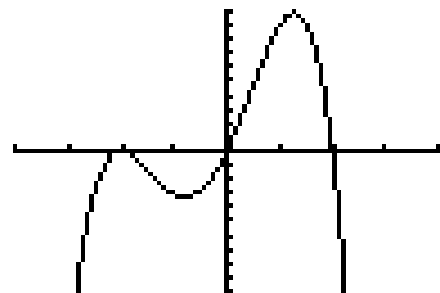
$\quad$ (A) $x + 2$ $\qquad$ (B) $x + 3$ $\qquad$ (C) $x - 2$ $\qquad$ (D) $x - 3$ $\qquad$ (E) $x - 1$

_____ 5. The value of *k* that will make $x + 1$ a factor of $kx^3 - 17x^2 - 4kx + 8$ is:

$\quad$ (A) −3 $\qquad$ (B) 3 $\qquad$ (C) −5 $\qquad$ (D) 4 $\qquad$ (E) −1

_____ 6. Which of the following equations could be the equation of the graph at right?

$\quad$ (A) $f(x) = x(x+2)^2(x-2)$ $\qquad$ (B) $f(x) = -x^2(x+2)(2-x)$

$\quad$ (C) $f(x) = x(x+2)^2(2-x)$ $\qquad$ (D) $f(x) = x(x+2)(x-2)^2$

$\qquad\qquad$ (E) $f(x) = -x(x+2)(x-2)^2$

_____ 7. If a function of degree 6 has roots of −1, 2, $\sqrt{2}+1$ and $i+1$, another root MUST be which of the following?

$\quad$ (A) $\sqrt{2}-1$ $\qquad$ (B) $1-\sqrt{2}$ $\qquad$ (C) $i-1$ $\qquad$ (D) −2 $\qquad$ (E) $-i-1$

_____ 8. What is the remainder when $f(x) = 2(x-1)^3 + 9$ is divided by *x*?

$\quad$ (A) 7 $\qquad$ (B) 5 $\qquad$ (C) 3 $\qquad$ (D) 2 $\qquad$ (E) 1

_____ 9. An equation of a polynomial of the form $y = Af(x)$ of lowest degree with the following characteristics $f(0) = -5$, $f(1) = 0$, $f(i) = 0$, and $f(\sqrt{2}) = 0$ has a vertical dilation value of $A =$

$\quad$ (A) -1 $\qquad$ (B) $\dfrac{2}{3}$ $\qquad$ (C) 3 $\qquad$ (D) $-\dfrac{5}{2}$ $\qquad$ (E) $-\dfrac{4}{3}$

_____ 10. An equation of an 8th degree polynomial with a negative leading coefficient whose only roots are $x = -5$ (m2), $x = -1$ (m2), $x = 3$ (m3) and $x = 5$ (m1) has how many relative extrema?

$\quad$ (A) 3 $\qquad$ (B) 4 $\qquad$ (C) 5 $\qquad$ (D) 6 $\qquad$ (E) 7

Part II: Free Response
Show all work and proper notation in the <u>space provided below each problem</u>. Be sure to <u>label your work</u> corresponding to each part (a), (b), (c), etc.

11. For $h(x) = -23x^4 - 34x^2 - 4x^5 - 7 + 4x^6 + 24x^3 + 28x$

   (a) Write $h(x)$ in standard form.

   (b) $\lim\limits_{x \to -\infty} h(x) =$

   (c) What is the coordinate, (x, y), of the y-intercept of $h(x)$?

   (d) List ALL the distinct, possible rational roots.

   (e) Given that $h(i) = 0$ and $x = \dfrac{1}{2}$ is a multiplicity 2 root (m2) of $h(x)$, use (and show) synthetic division to find all the exact values of the other complex roots guaranteed by the Fundamental Theorem of Algebra. **List** all you final roots at the ends as $x =$