COLLEGE ALGEBRA QUIZ

(1) Factor $f(x) = x^4 - 10x^3 + 9x^2 + 160x - 400$, then solve $f(x) = 0$
Solution: $f(x) = (x - 5)^2(x + 4)(x - 4)$; 5,-4,4

(2) Factor $f(x) = x^4 - 4x^2 + 3$, then solve $f(x) = 0$
Solution: $f(x) = (x + 1)(x - 1)(x^2 - 3)$; $-1, 1, \pm\sqrt{3}$

(3) Find a polynomial function of degree 3 with $-5, 1 - i, 1 + i$ as zeros.
Solution: $f(x) = x^3 + 3x^2 - 8x + 10$

(4) Find a polynomial function f degree 4 with -7 as a zero of multiplicity 3 and $\frac{1}{2}$ as a zero of multiplicity 1.
Solution: $f(x) = 2x^4 + 41x^3 + 273x^2 + 539x - 343$

(5) Suppose that a polynomial function of degree 5 with rational coefficients has the zeros: $0, 1 + \sqrt{2}, -\sqrt{2}$. Find the other zero(s).
Solution: $1 - \sqrt{2}, \sqrt{2}$

(6) Find a polynomial function of lowest degree with rational coefficients and $-2, 5, 1+i$ as some of its zeros.
Solution: $f(x) = x^4 - 5x^3 - 2x^2 + 14x - 20$

(7) List all possible rational zeros for $h(x) = 4x^5 - 7x^3 + 2x - 12$.
Solution: $\pm\frac{1}{4}, \pm\frac{1}{2}, \pm\frac{3}{4}, \pm 1, \pm\frac{3}{2}, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

(8) For, $f(x) = x^3 - 5x^2 + 5x + 3$ identify the rational and non-rational zeros by solving $f(x) = 0$, then factoring $f(x)$ into its linear factors.
Solution: Rational: 3, Non-Rational: $1 \pm \sqrt{2}$

(9) What does Descartes' rule of signs tell you about the number of positive real zeros and the number of negative real zeros of $f(x) = -x^8 + 4x^5 - 6x^3 + 2x - 2$.
Solution: positive real zeros: 4 or 2 or 0, and negative real zeros: 2 or 0.