Name:_____

SM3 3.2: Rational Root Theorem

Memorize: Given a polynomial with lead coefficient q and constant p, the possible rational roots are given by $\pm\frac{factors\ of\ p}{factors\ of\ q}$.

Vocab: lead coefficient, constant, rational, synthetic division

For questions 1-3, state the possible rational roots:

1) $a(x) = x^4 + x^2 + 2x - 3$

2) $b(x) = 2x^2 - 5x + 3$

3) $c(x) = 4x^6 - x^5 + 3x^3 - 2x + 10$

For problems 4-13, find all of the zeros of each function and write in completely factored form:

4) $f(x) = x^3 - 3x - 2$

5) $g(x) = x^3 + x^2 - 80x - 300$

6) $h(x) = x^3 + 4x^2 + 3x$

7) $j(x) = 2x^3 - 15x^2 + 31x - 12$

8) $k(x) = 2x^3 - x^2 - 15x + 18$

9) $l(x) = 6x^3 - 5x^2 - 2x + 1$

10) $m(x) = x^4 - 5x^2 - 36$

11) $n(x) = x^3 - 4x^2 + 6x - 4$

12) $p(x) = x^3 - 5x^2 + 7x + 13$

For questions 13-15, find a third degree polynomial with rational coefficients that has the given roots.

13) $x = \{-3, 2, 1\}$

14) $x = \{2i, -2i, 3\}$

15) $x = \{0, 5, -6\}$

16) $x = \{4, -3i\}$