

Show all your work if you want to receive credit.

1. List the possible rational roots of the polynomial $p(x) = 6x^5 - 7x^2 + 3x + 14$.
2. A polynomial $p(x)$ has real coefficients, a root at $x = 0$ with multiplicity 2, and $x = 2 - i$. If $p(1) = 4$, find the expanded form of $p(x)$.
3. Sketch the graph of $p(x) = -2x(x - 2)^2(x + 3)$.
4. For the function $y = \frac{(x - 2)(x + 2)}{(x - 2)(x - 5)(x + 1)}$, find the following. Be sure to list points in the form (x, y) , not as just a single number. Also be sure to list asymptotes as equations.
 - (a) x -intercept(s): _____
 - (b) y -intercept: _____
 - (c) vertical asymptote(s): _____
 - (d) horizontal asymptote: _____
 - (e) location(s) where graph crosses the horizontal asymptote: _____
 - (f) hole: _____
5. For the function $y = \frac{x^3 + 7}{x^2 - 1}$, find the following. Be sure to list points in the form (x, y) , not as just a single number. Also be sure to list asymptotes as equations.

(a) x -intercept(s): _____	(c) vertical asymptote(s): _____
(b) y -intercept: _____	(d) other asymptote: _____
6. A rational function has the following characteristics. Sketch the graph.

• x -intercept(s): $(-2, 0)$ and $(2, 0)$	• horizontal asymptote: $y = 1$
• y -intercept: $(0, 2)$	• graph crosses horizontal asymptote at $(1, 1)$
• vertical asymptotes: $x = -1$ and $x = 5$	• no hole
7. A rational function has the following characteristics. Sketch the graph.

• x -intercept(s): $(-7, 0)$, $(-4, 0)$ and $(-3, 0)$	• other asymptote: $y = 1 + x$
• y -intercept: $(0, 5)$	• graph does not cross other asymptote
• vertical asymptote: $x = -5$	• no holes
8. A restaurant has 100 tables that earn \$60 of revenue per table. For every table added (or removed), the revenue per table decreases (increases) by \$2 per table. Using x to represent the number of table added or removed from the restaurant, determine the total number of tables so that you maximize the total revenue.
9. Suppose the revenue for a restaurant is given by $R(x) = -x^2 + 200x + 1000$ where x is the total number of tables. The costs associated with running the restaurant are \$100 per table. Find the total number of tables that maximizes the profit for the restaurant.
10. A cell phone company can sell \$2000 of phones at a price of \$10 each. It also can sell \$3000 of phones at either \$15 or \$25 each. Find a quadratic function that models the revenue function $R(x)$ where x represents the price of an individual phone.