

Chapter 3 Review

To be completed on a separate piece(s) of paper. Show all of your work.

1. Which of the following are polynomial functions? Justify your answer.

a) $y = \sqrt{x+1}$

b) $f(x) = 3x^4$

c) $g(x) = -3x^3 - 2x^2 + x$

d) $y = \frac{1}{2}x + 7$

2. Describe the end behavior and its corresponding graph (linear, quadratic, cubic, etc.). State the possible number of x – intercepts and the value of the y – intercept.

a) $h(x) = x^4 - 3x^2 + 5x$

b) $p(x) = -x^3 + 5x^2 - x + 4$

c) $y = 3x - 2$

d) $y = -2x^2 - 4$

e) $t(x) = 2x^5 - 3x^3 + 1$

3. Use the Remainder Theorem to determine the remainder of each function. Then, perform each division using the indicated method. Express your answer as a division statement in the form

$$\frac{P(x)}{x-a} = Q(x) + \frac{R}{x-a}.$$

a) $x^3 + 9x^2 - 5x + 3$ divided by $x - 2$ using long division

b) $2x^3 + x^2 - 2x + 1$ divided by $x + 1$ using synthetic division

c) $-8x^4 - 4x + 10x^3 + 15$ divided by $x + 1$ using long division

4. a) Determine the value of k such that when $f(x) = x^4 + kx^3 - 3x - 5$ is divided by $x - 3$, the remainder is -14 .

b) Using your k value from part (a), determine the remainder when $f(x)$ is divided by $x + 3$.

5. For what value of b will the polynomial $P(x) = 4x^3 - 3x^2 + bx + 6$ have the same remainder when it is divided by both $x - 1$ and $x + 3$?

6. Factor fully.

a) $x^3 - 4x^2 + x + 6$

b) $-4x^3 - 4x^2 + 16x + 16$

c) $x^4 - 4x^3 - x^2 + 16x - 12$

7. Determine the value of k so $x + 3$ is a factor of $x^3 + 4x^2 - 2kx + 3$.

8. For each function, determine

- The x - intercepts of the graph
- The degree and end behavior of the graph
- The zeros and their multiplicity
- The y - intercept of the graph
- The interval(s) where the function is positive and the interval(s) where the function is negative

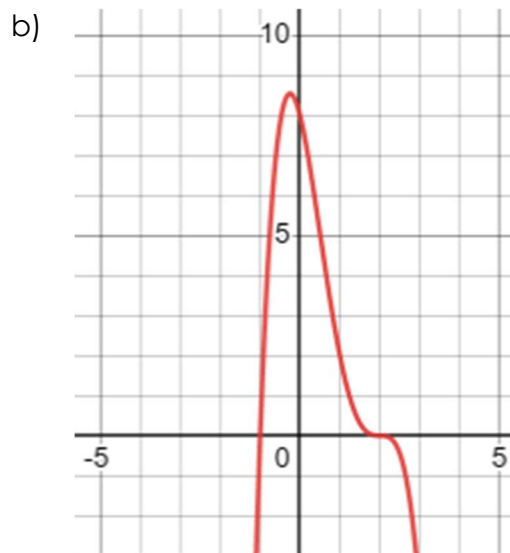
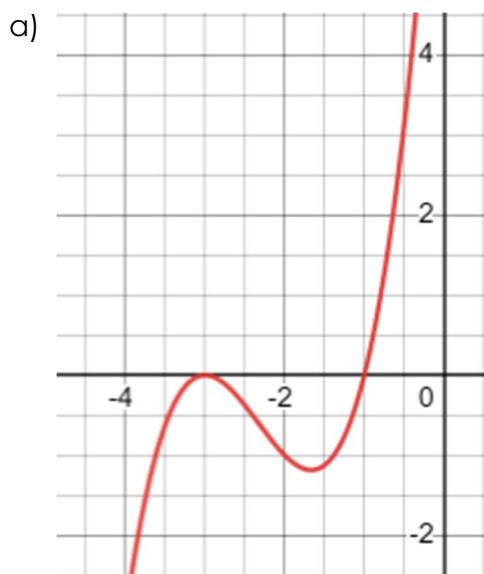
Then, sketch the graph.

a) $y = (x + 1)(x - 2)(x + 3)$

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

c) $g(x) = x^4 - 16x^2$

9. Determine the equation of the polynomial function (in factored form) that corresponds to each graph.



10. The zeros of a quartic function are -2 , -1 , and 3 (multiplicity of 2).

a) Determine equations for two functions that satisfy this condition.

b) Determine the equation of the function that satisfies this condition and passes through the point $(2, 24)$.