

**Practice Regents problems #12**

AII-F.BF.6 Represent and evaluate the sum of a finite arithmetic or finite geometric series, using summation (sigma) notation. For geometric series:

$$\sum_{k=1}^n a_k = a_1 + a_2 + \dots + a_n = a_1 \left( \frac{1 - r^n}{1 - r} \right)$$

1. Given the sequence  $12\frac{1}{4}, 21\frac{3}{4}, 31\frac{1}{4}, 40\frac{3}{4}, \dots$ 
  - (a) Determine whether the sequence is arithmetic or geometric, then find the common difference  $d$  or the common ratio  $r$ .
  - (b) Write a recursive formula for the sequence.
  - (c) Write an explicit formula for the sequence.
  - (d) Find the fifth term the sequence.
2. Express each of the following in simplest radical form.

(a)  $(27x^2)^{\frac{1}{3}}$

(b)  $(4x^4)^{\frac{3}{2}}$

AII-F.LE.2: Construct a linear or exponential function symbolically given: a graph, a description of the relationship, or two input-output pairs (include reading these from a table).

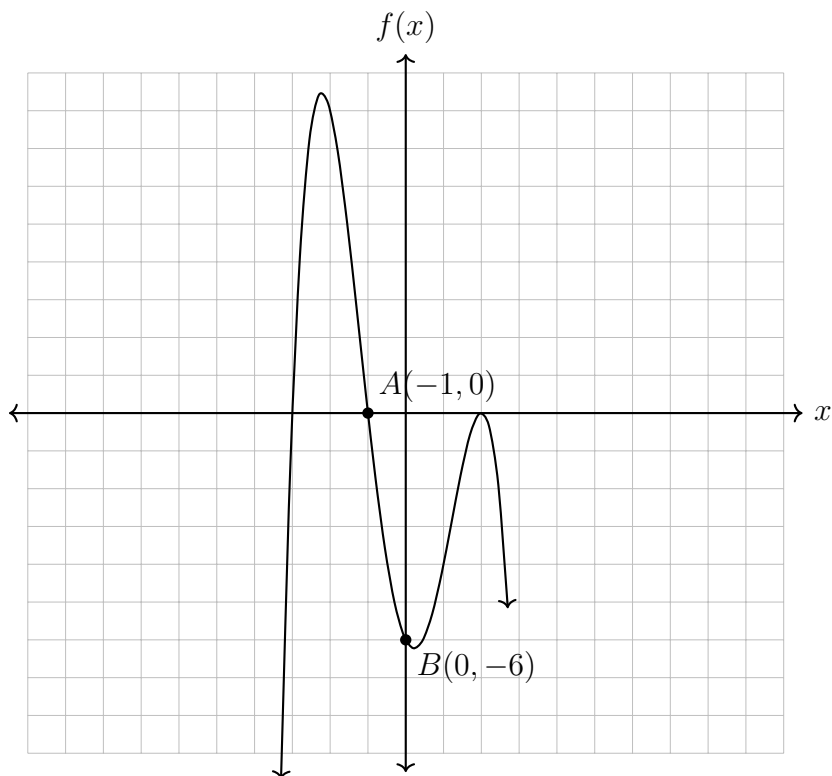
3. Given the quartic function  $f(x) = a(x - 1)(x - 2)^2(x + 3)$ , graphed below.

(a) Is the leading coefficient  $a$  positive or negative?

(b) Write down the order of the function.

(c) Over the interval  $-1 < x < 0$ , is the function increasing, decreasing, or constant? (make sure your answer is consistent with your answer to (a))

(d) Find the average rate of change of the function over the interval from point  $A$  to point  $B$ .



4. Go through the steps to factor by grouping  $f(x) = x^3 + 2x^2 - x - 2$

(a) Use your calculator to find the zeros of the function.

(b) Write down the factors of the function.

(c) Write the final row and complete the grouping step by filling in the blanks.

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

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

$$= \underline{\hspace{2cm}} (x + 2) - \underline{\hspace{2cm}} (x + 2)$$

$$= (x^2 - 1)(x + 2)$$

$$=$$

5. Go through the steps to factor by grouping  $f(x) = x^3 + 3x^2 - 4x - 12$