

Exercise A.3.29, 31, 33 Tell whether the expression is a polynomial. If it is, give its degree. If it is not, state why not.

A.3.29  $3x^2 - \frac{5}{x}$

Solution

A polynomial is of the form

$$a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0.$$

So a polynomial is a sum of monomials of the form  $a x^k$  where  $k \geq 0$  is an integer. But the given expression involves the term  $-\frac{5}{x} = (-5)x^{-1}$

and since a polynomial does not contain a negative power of  $x$ , then

NO, this is not a polynomial.  $\square$

A.3.31  $2y^3 - \sqrt{2}$

Solution

With  $a_3 = 2$ ,  $a_2 = a_1 = 0$ , and  $a_0 = \sqrt{2}$ , this, YES, is a polynomial.

The variable is  $y$  and the degree is 3.  $\square$

A.3.33  $\frac{x^2 + 5}{x^3 - 1}$

Solution

This is not the form of a polynomial (as stated above) because of the division by  $x^3 - 1$ . So, NO, this is not a polynomial.

In fact, we'll see in Appendix A.5 that this is a RATIONAL EXPRESSION.  $\square$