CALCULUS
Problem Bank
Polynomials and rational functions
\[(5q^3 - 2q + 4)(2q + 7) + (q^3)(2q^7 - 9q + 4)\]

(a) a polynomial in \(q\)

(b) rational, nonpolynomial in \(q\)

(c) transcendental in \(q\)

(d) none of the above
\[
\frac{5q^3 - 2q + 4}{2q + 7} + \frac{(q^3 + 4)(2q - 3)}{2q^7 - 9q + 4}
\]

(a) a polynomial in \( q \)

(b) **rational, nonpolynomial** in \( q \)

(c) transcendental in \( q \)

(d) none of the above
\[
\sin \left( \frac{3t^2 + 5t - 1}{2t^3 + t^2 - 1} \right)
\]

(a) a polynomial in \( t \)

(b) rational, nonpolynomial in \( t \)

(c) transcendental in \( t \)

(d) none of the above
\[ x^2 + 3\sqrt{x} + 1 \text{ is } \] ??

(a) polynomial
(b) rational, not polynomial
(c) algebraic, not rational
(d) none of the above
\[
\frac{2x^3 - x + 5}{x^2 + 4x + 1} \quad \text{is} \quad \text{??}
\]

(a) polynomial  
(b) rational, not polynomial  
(c) algebraic, not rational  
(d) none of the above
$10^x$ is ??

(a) polynomial
(b) rational, not polynomial
(c) algebraic, not rational
(d) none of the above

Correct answer: transcendental
(a) polynomial
(b) rational, not polynomial
(c) algebraic, not rational
(d) none of the above
\[ \frac{3x^3 + 2x}{x} \] is \ldots

(a) a polynomial in \( x \)

(b) rational in \( x \)

(c) transcendental in \( x \)

(d) none of the above
\[
\frac{(q^2 - 1)(3q^3 - 2q^2 + q - 7)}{q^2 - 1}
\]
is ...

(a) a polynomial in \( q \)

(b) rational, nonpolynomial in \( q \)

(c) transcendental in \( q \)

(d) none of the above
(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above
\[ x^2 + 3x + 1 \text{ is ??} \]

(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above
\[ x^2 + 3\sqrt{x} + 1 \text{ is ??} \]

(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above
\[ \sin x \] is ??

(a) polynomial
(b) rational, not polynomial
(c) algebraic, not rational
(d) none of the above

Correct answer: transcendental
(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above
(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above

Correct answer: transcendental

$10^x$ is ⎯?
$\frac{1}{x}$ is ??

(a) polynomial

(b) rational, not polynomial

(c) algebraic, not rational

(d) none of the above
Quartic coefficient in

\[3x^5 + x^4 - x^3 + 8x + \pi\]

(a) 1

(b) 3

(c) −1

(d) none of the above
Leading coefficient in $3x^5 + x^4 - x^3 + 8x + \pi$

(a) 1

(b) 3

(c) \(-1\)

(d) none of the above