For problems 1-4, factor completely, and then determine the roots of each polynomial.

Be sure to state the multiplicities as well.

1.
$$x^6 + 18x^4 + 81x^2$$
 2. $x^5 + 2x^3 - 35x$

3.
$$3x^5 + 18x^4 - 48x^3$$

4. $8x^{11} - 16x^{10} - 24x^9$

5. Rewrite the polynomial in standard form. Then classify according to degree & number of terms.

$$5 + 2q^3r^2 - 4r$$

Solutions:

For problems 1-4, factor completely, and then determine the roots of each polynomial.

Be sure to state the multiplicities as well.

2.
$$x^{6} + 18x^{4} + 81x^{2}$$

 $= x^{2}(x^{4} + 18x^{2} + 81)$
 $= x^{2}(x^{2} + 9)(x^{2} + 9)$
 $= x^{2}(x^{2} + 9)^{2}$
So $x = 0$ (M.2), $x = 3i$ (M2.),
and $x = -3i$ (M.2)
4. $3x^{5} + 18x^{4} - 48x^{3}$
 $= 3x^{3}(x^{2} + 6x - 16)$
 $= 3x^{3}(x + 8)(x - 2)$
So $x = 0$ (M.3), $x = -8$ (M.1), $8x = 2$ (M.1)
 $x = x^{3} - 35x$
 $= 8x^{9}(x^{2} - 2x - 3)$
 $= 8x^{9}(x - 3)(x + 1)$
So $x = 0$ (M.3), $x = -8$ (M.1), $8x = 2$ (M.1)
 $x = x^{3} - 35x$
 $= 8x^{9}(x^{2} - 2x - 3)$
 $= 8x^{9}(x - 3)(x + 1)$
So $x = 0$ (M.3), $x = -8$ (M.1), $8x = 2$ (M.1)
 $x = x^{3} - 35x^{3} - 35x^{3}$

6. Rewrite the polynomial in standard form. Then classify according to degree & number of terms.

 $5 + 2q^3r^2 - 4r$

 $2q^{3}r^{2} - 4r + 5$; quintic trinomial