For problems 1-4, factor completely, and then determine the roots of each polynomial.
Be sure to state the multiplicities as well.

1. $x^{6}+18 x^{4}+81 x^{2}$
2. $x^{5}+2 x^{3}-35 x$
3. $3 x^{5}+18 x^{4}-48 x^{3}$
4. $8 x^{11}-16 x^{10}-24 x^{9}$
5. Rewrite the polynomial in standard form.

Then classify according to degree \& number of terms.
$5+2 q^{3} r^{2}-4 r$

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

Be sure to state the multiplicities as well.
2. $x^{6}+18 x^{4}+81 x^{2}$
2. $x^{5}+2 x^{3}-35 x$
$=x^{2}\left(x^{4}+18 x^{2}+81\right)$
$=x\left(x^{4}-2 x^{2}-35\right)$
$=x^{2}\left(x^{2}+9\right)\left(x^{2}+9\right)$
$=x\left(x^{2}-7\right)\left(x^{2}+5\right)$
$=x^{2}\left(x^{2}+9\right)^{2}$
so $x=0$ (M.2), $x=3 i(M 2$.$) ,$
so $x=0$ (M.1), $x=\sqrt{ } 7$ (M.1), $x=-\sqrt{ } 7$ (M.1)
and $x=-3 i(M .2)$
$x=i \sqrt{ } 5(M .1)$, and $x=-i \sqrt{ } 5(M .1)$

> 4. $\quad 3 x^{5}+18 x^{4}-48 x^{3}$
> $=3 x^{3}\left(x^{2}+6 x-16\right)$
> $=3 x^{3}(x+8)(x-2)$
4. $8 x^{11}-16 x^{10}-24 x^{9}$
$=8 x^{9}\left(x^{2}-2 x-3\right)$
$=8 x^{9}(x-3)(x+1)$
So $x=0$ (M.3), $x=-8$ (M.1), \& $x=2$ (M.1)
so $x=0(M .9), x=3(M .1)$, and $x=-1$ (M.1)
6. Rewrite the polynomial in standard form.

Then classify according to degree $\&$ number of terms.

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

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

