1. Find all EXACT complex zeros by factoring: $y = 4x^7 + 16x^5 - 180x^3$

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1. Find all EXACT complex zeros by factoring: $y = 4x^7 + 16x^5 - 180x^3$

$$4x^3(x^4 + 4x^2 - 45)$$

$$\frac{-45}{+9 \times -5}$$
$$+4$$

$$\rightarrow \quad 4x^3(x^2+9)(x^2-5)$$

$$x^2+9=0 \qquad x^2-5=0$$
$$\sqrt{x^2}=\sqrt{-9} \qquad \sqrt{x^2}=\sqrt{5}$$
$$x = \pm 3i \qquad x = \pm\sqrt{5}$$

$$\boxed{x = 0, \pm 3i, \pm\sqrt{5}}$$

2. Use this polynomial: $y = x^4 - x^3 - 18x^2 + 6x + 72$
Two zeros are –3 and 4, find the EXACT remaining real zeros.

$$\begin{array}{r|rrrrr}
-3 & 1 & -1 & -18 & 6 & 72 \\
   &   & -3 & 12 & 18 & -72 \\
\hline
   & 1 & -4 & -6 & 24 & 0
\end{array}$$

$$x^3 - 4x^2 - 6x + 24$$

$$\begin{array}{r|rrrr}
4 & 1 & -4 & -6 & 24 \\
  &   & 4 & 0 & -24 \\
\hline
  & 1 & 0 & -6
\end{array}$$

$$x^2 - 6$$

$$x^2 - 6 = 0$$
$$\sqrt{x^2} = \sqrt{6}$$

$$\boxed{x = \pm\sqrt{6}}$$