5.5. Functions of form $\frac{1}{x^p}$

Aims:

1) Students know that $\frac{1}{x^p}$ is special case of the power function $y = kx^p$
2) Students know what special property's function $\frac{1}{x^p}$ m ay exhibit when *p* is odd and when *p* is even.
3) Apply these properties in graphing function $\frac{1}{x^p}$.

Definition of power function

Definition:

A power function is a single – term function that contains a variable as its base and a constant for its exponent.

In case of function $y = \frac{1}{x^p}$ we speak about power functions where $k = 1$ and $p < 0$.

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Power functions where p = - 1, - 3, - 5, …

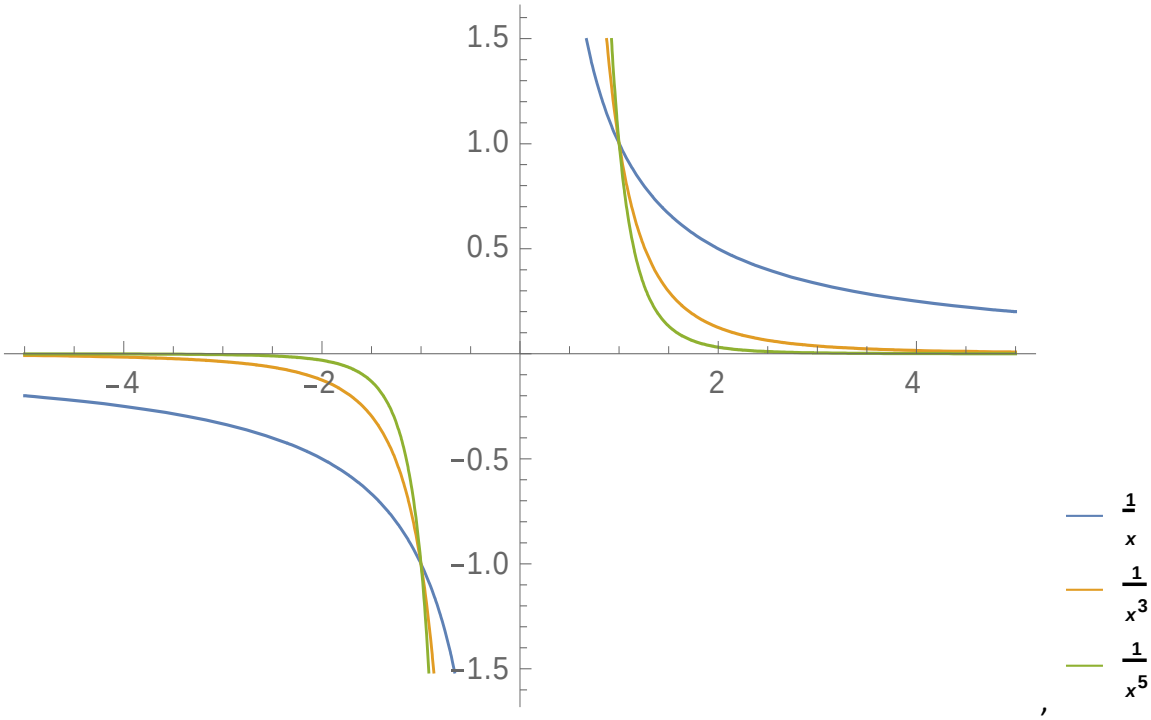

Figure 5.43 Graph 1

Properties:

- Domain: $X \neq 0$
- Domain of variation: $Y \neq 0$
- Eveness and odness: $y(-x) = -y(x)$ → odd
- Monotomy: monotonus
- Extremes: none
- Intersection points with coordinate axes: none
- Domain of convexity: $\check{X} = (-\infty; 0)$; $\hat{X} = (0; +\infty)$
- Inflection point: none
- Inverse functions:
  - If $p = -1$, then $x = \frac{1}{y}$
  - If $p < -2$, then $x = \frac{1}{\sqrt[|p|]{y}}$

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Power functions where p = - 2, - 4, -6, …

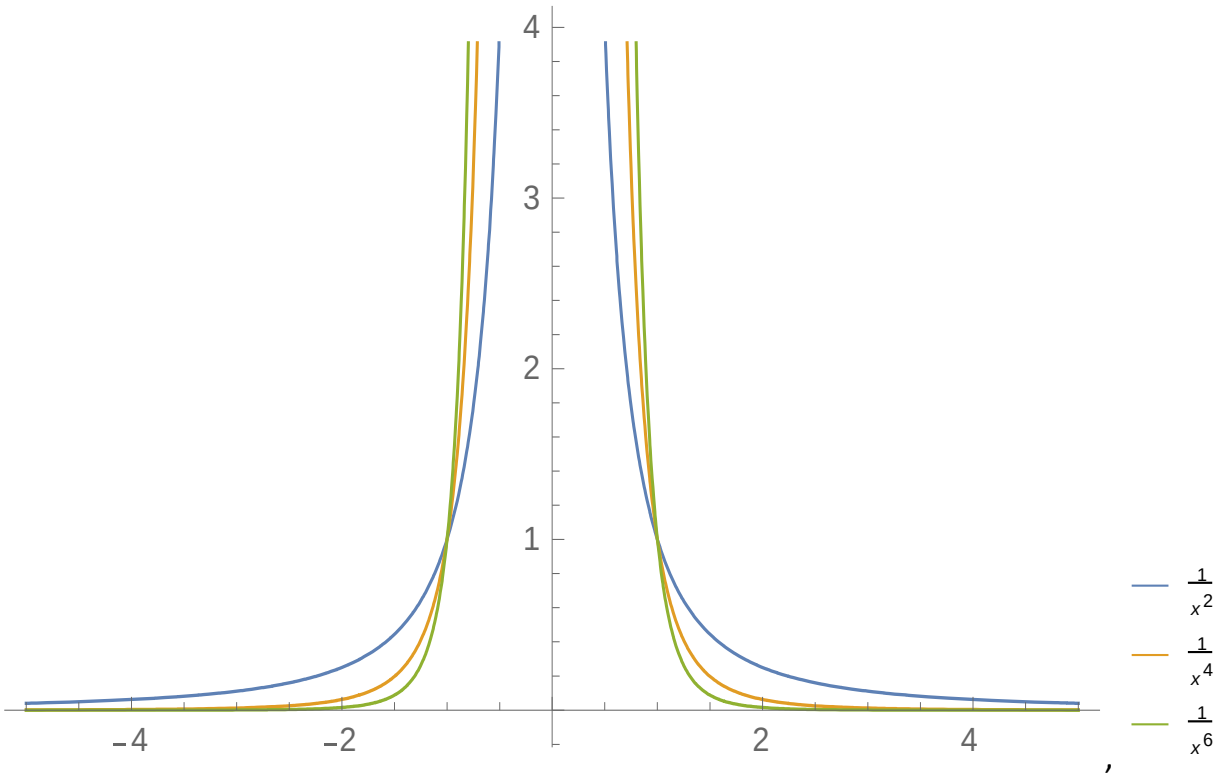

Figure 5.44 Graph 2

Properties:

- Domain: $X \neq 0$
- Domain of variation: $Y > 0$
- Eveness and odness: $y(-x) = -y(x) \rightarrow$ odd
- Monotomy: $X \uparrow = (-\infty; 0)$; $X \downarrow = (0; +\infty)$
- Extremes: none
- Intersection points with coordinate axes: none
- Domain of convexity: $\hat{X} = (-\infty; 0)$
- Inflection point: none
- Inverse functions:
  - If $p = -2$, then $x = \frac{1}{\sqrt{y}}$
  - If $p < -2$, then $x = \frac{1}{|p|\sqrt{y}}$

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