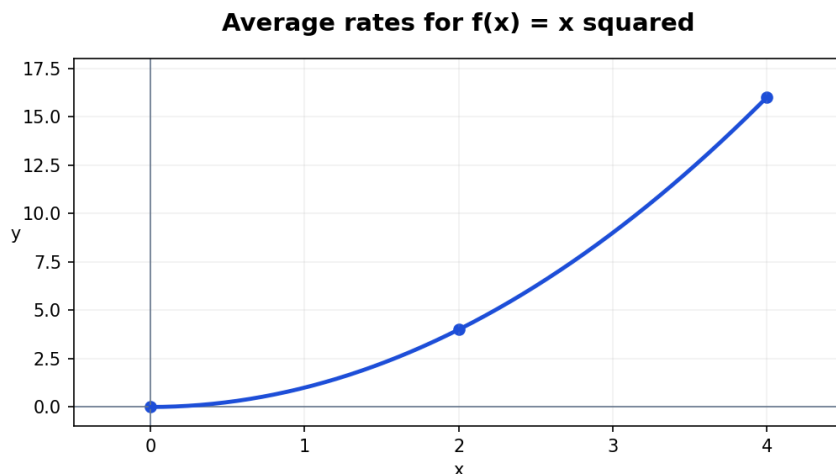


Problems | Name: _____

1.1 Average Rate of Change

1.1.1. For $f(x) = x^2$, find the average rate of change on $[0, 2]$ and $[2, 4]$.



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Compare output change divided by input change on the two intervals.

1.1.2. A car travels from mile marker 12 to mile marker 72 in 1.5 hours. Find average velocity.

1.1.3. For $f(x) = 3x - 7$, show the average rate on any interval is 3.

Problems | Name: _____

1.2 Successive Differences and Degree

1.2.1. Inputs 0, 1, 2, 3 give outputs 0, 1, 4, 9. Find the first and second differences.

1.2.2. Can ordinary successive-difference degree tests be used unchanged at inputs 0, 1, 3, 6?

1.2.3. Outputs 1, 8, 27, 64, 125 occur at inputs 1, 2, 3, 4, 5. Find the third differences.

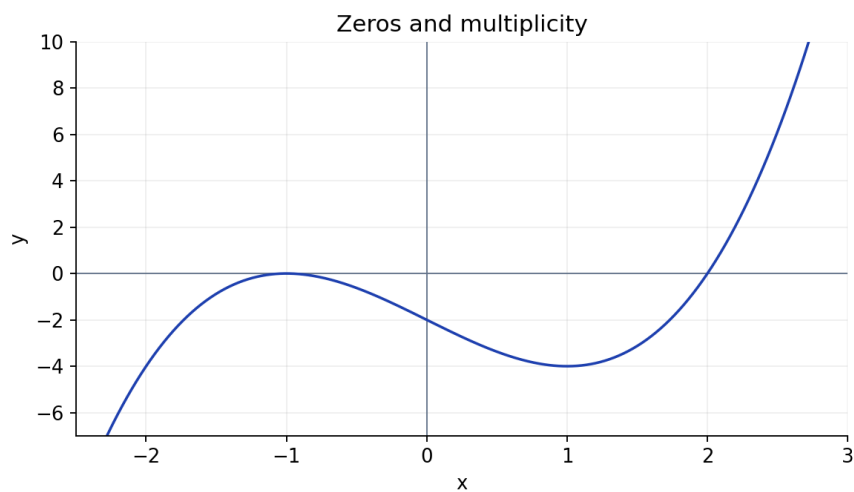
Problems | Name: _____

1.3 Zeros and Multiplicity

1.3.1. List zeros and multiplicities of $(x - 4)^3(x + 1)^2$.

1.3.2. Write a monic quadratic with zeros -2 and 5 .

1.3.3. Use the graph of $y = (x + 1)^2(x - 2)$ to describe its zeros and whether it crosses or touches.



Compare the graph at its two zeros.

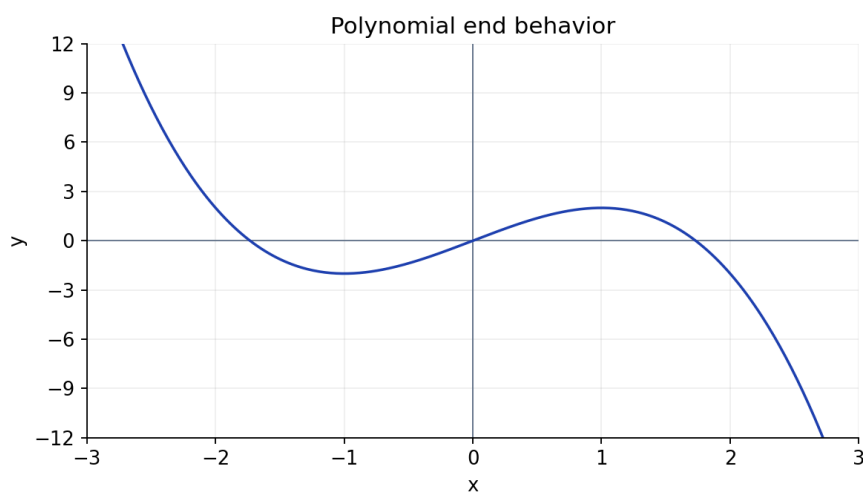
Problems | Name: _____

1.4 End Behavior

1.4.1. Describe the ends of $f(x) = 5x^6 - x^2 + 2$.

1.4.2. Describe the ends of $g(x) = -x^5 + 2x^2$.

1.4.3. Use the graph of $y = -x^3 + 3x$ to identify its end behavior.



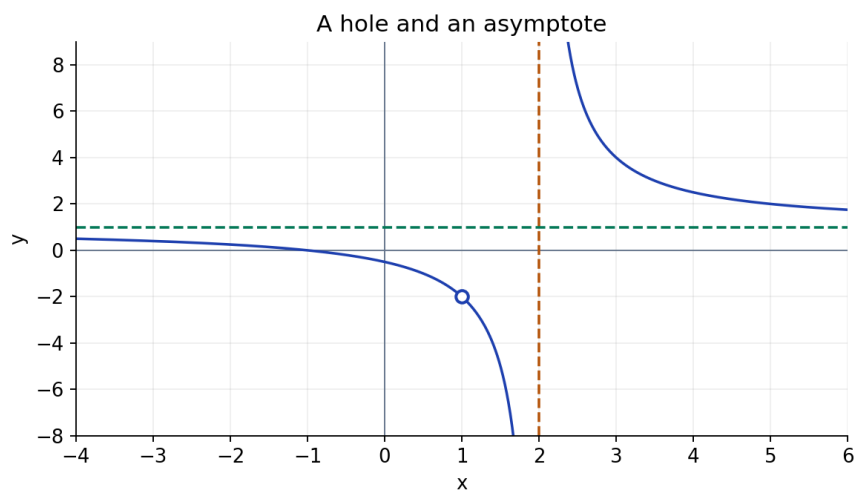
Problems | Name: _____

1.5 Vertical Asymptotes and Holes

1.5.1. Simplify $(x^2 - 4)/(x - 2)$ and state the hole.

1.5.2. Find the excluded input and vertical asymptote of $1/(x + 3)$.

1.5.3. For the graphed function $f(x) = (x^2 - 1)/((x - 1)(x - 2))$, state the hole and vertical asymptote.



Original denominator exclusions remain after cancellation.

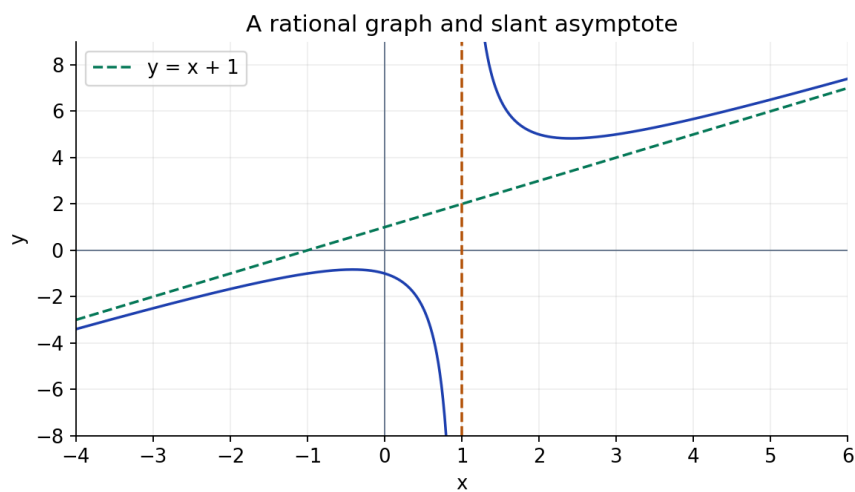
Problems | Name: _____

1.6 End Behavior of Rational Functions

1.6.1. Find the horizontal asymptote of $(2x + 1)/(x^2 + 4)$.

1.6.2. Find the horizontal asymptote of $(5x^3 - 1)/(2x^3 + x)$.

1.6.3. Use the graph of $y = (x^2 + 1)/(x - 1)$ to identify its slant and vertical asymptotes.



Compare the curve with the dashed line away from the vertical asymptote.

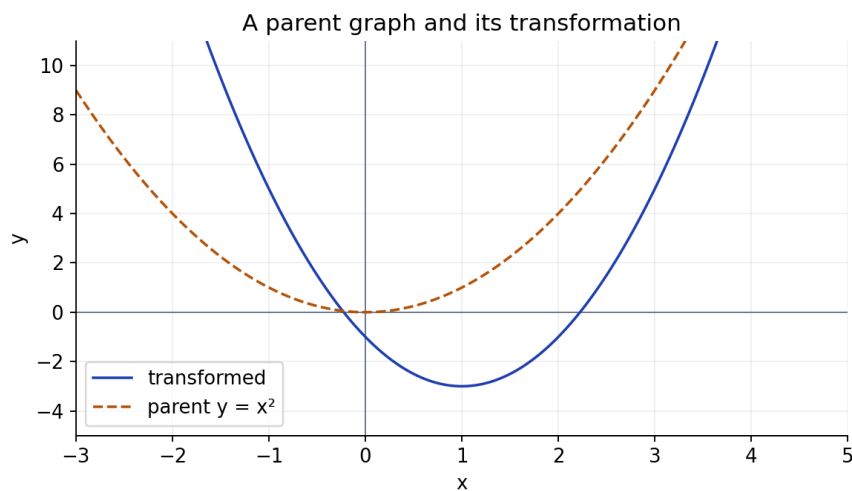
Problems | Name: _____

1.7 Transformations of Functions

1.7.1. Describe $y = 3\sqrt{x+1} - 2$ relative to $y = \sqrt{x}$.

1.7.2. Transform $y = x^2$ by reflecting across the x-axis and moving down 4.

1.7.3. Compare the parent graph and transformed graph $y = 2(x-1)^2 - 3$. State its vertex and vertical scale.



Compare position, orientation, and vertical scale.
