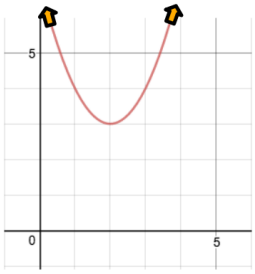
Progress Check Follow Up: Domain, Range and End Behavior (A7) Name _____

For each function below, identify the domain, range and end behavior. Make sure to use appropriate notation. THE SOLUTIONS ARE WRITTEN AND EXPLAINED BELOW.

For each function below identify the domain, range, and end behavior. Make sure to use appropriate notation.

1.



Domain: $(-\infty, \infty)$ or $x \in \mathbb{R}$

Range: $[3, \infty)$ or $y \geq 3$

End Behavior:
as $x \to \infty, y \to \infty$
as $x \to -\infty, y \to \infty$

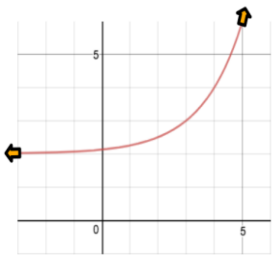
The Domain is all real numbers or (−∞,∞) because all x-values are being used to create the graph from left to right. No x-value is left out.

The Range is all y-values greater than or equal to 3, also represented as the interval [3 ,∞), because all y-values beginning at 3 and higher are being used to create the graph from lowest to highest. The value 3 is the lowest y-value that the graph uses at its *minimum*, and the 3 is included. The graph continues to use y-values higher than 3 as it goes up forever.

The End Behavior describes what the graph is doing on the two ends where the arrows are. We describe x first then y next. But since there are two ends of the graph, we need to make two separate statements in our answer.

- For the first statement "as x→∞, y→∞", we are representing the arrow on the graph that continues forever on the right side by writing "as x→∞". We use a positive infinity to show we're talking about the right end. Then we describe what is happening to the y-values as we are going to the right, and since the y-values are getting higher and higher, we write "y→∞".
- For the second statement "as x→ − ∞, y→∞", we are representing the arrow on the graph that continues forever on the left side by writing "as x→ − ∞". We use a negative infinity to show we're talking about the left end. Then we describe what is happening to the y-values as we are going to the left, and since the y-values are getting higher and higher, we write "y→∞".

2.



Domain: $(-\infty, \infty)$ or $x \in \mathbb{R}$

Range: $(2, \infty)$ or $y > 2$

End Behavior:
as $x \to \infty, y \to \infty$
as $x \to -\infty, y \to 2$

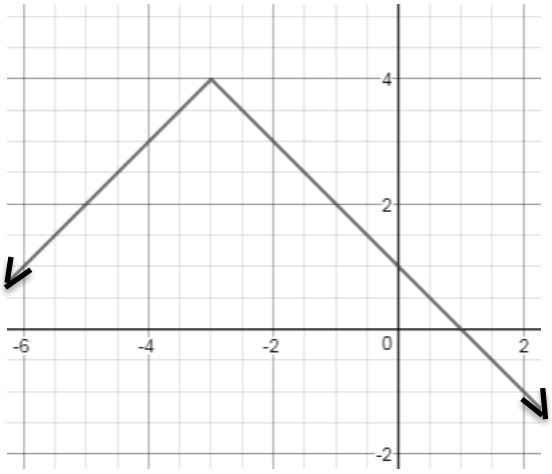
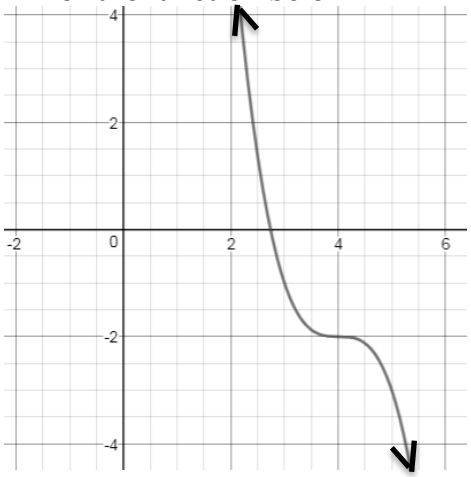
The Domain is all real numbers or (−∞,∞) because all x-values are being used to create the graph from left to right. No x-value is left out.

The Range is all y-values greater than 2, also represented as the interval (2 ,∞), because this graph has a *horizontal asymptote* at y=2 and the graph is drawn above that asymptote. This means that the graph is located right above an imaginary horizontal line at y=2, and it gets very close to this line but never touches it. Thus, all y-values above the value of 2, but not including the value of 2, are being used to create the graph from lowest to highest.

The End Behavior describes what the graph is doing on the two ends where the arrows are. We describe x first then y next. But since there are two ends of the graph, we need to make two separate statements in our answer.

- For the first statement "as x→∞, y→∞", we are representing the arrow on the graph that continues forever on the right side by writing "as x→∞". We use a positive infinity to show we're talking about the right end. Then we describe what is happening to the y-values as we are going to the right, and since the y-values are getting higher and higher, we write "y→∞".
- For the second statement "as x→ − ∞, y→2", we are representing the arrow on the graph that continues forever on the left side by writing "as x→ − ∞". We use a negative infinity to show we're talking about the left end. Then we describe what is happening to the y-values as we are going to the left, and since the y-values are getting closer and closer to the horizontal asymptote, we write "y→2".

EXTRA PRACTICE:

i. Will a quadratic function ever have a domain other than all real numbers? Explain why.	i. Will an exponential function ever have a domain other than all real numbers? Explain why.
ii. For all quadratic functions the range will always be y is greater than or equal to OR less than or equal to which key feature?	ii. For all exponential functions the range will always be y is greater than OR less than which key feature?
iii. If you know the end behavior for one side of a quadratic function, what will the end behavior be for the other side? For example: If as x approaches infinity, y approaches negative infinity, then what would y approach as x approaches negative infinity? Explain your reasoning.	iii. What key feature will the y-value of one side of the end behavior of an exponential function always approach?
iv. Identify the Domain, Range, and End Behavior for the function below.  Domain: Range: End Behavior:	iv. Identify the Domain, Range, and End Behavior for the function below.  Domain: Range: End Behavior: