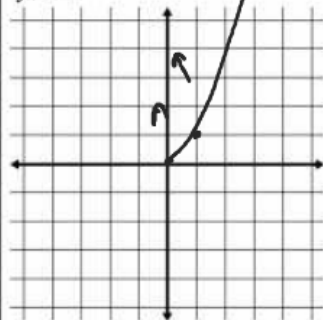


Sketch a graph of the following functions

$$y = x^{3/2}$$



1) Determine the domain and range

$$D: [0, \infty)$$

$$R: [0, \infty)$$

2) Is the function even, odd or undefined for $x < 0$

3) Intervals of Increase or Decrease

$$\text{Inc } (0, \infty)$$

4) Find any extrema.

$$\text{min } (0, 0)$$

5) Determine the end behavior

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow 0} f(x) = 0$$

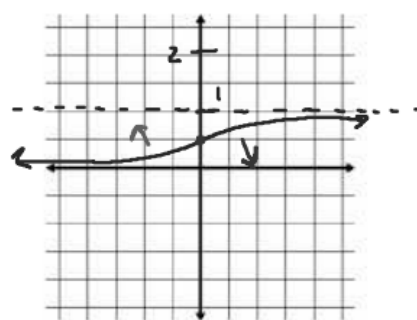
6) Find any asymptotes

None

7) Intervals of Concavity

$$\text{Concave up } (0, \infty)$$

$$f(x) = \frac{1}{1 + e^{-x}}$$



1) Determine the domain and range

2) Is the function even, odd or undefined for $x < 0$

3) Intervals of Increase or Decrease

4) Find any extrema.

5) Determine the end behavior

$$\lim_{x \rightarrow \infty} f(x) = 1 \quad \lim_{x \rightarrow -\infty} f(x) = 0$$

6) Find any asymptotes

$$y = 0$$

$$y = 1$$

7) Intervals of Concavity

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What you'll Learn About

y-intercept
Let $x=0$
Solve for y

Describe how to transform the graph of an appropriate function $f(x) = x^n$. Then find the y-intercept of the function.

$$f(x) = x^3$$

$$f(x) = x^3$$

a) $f(x) = 5(x+4)^3$

Vertical Stretch by factor of 5
Shift Left 4

y-intercept

$$\begin{aligned} f(0) &= 5(0+4)^3 \\ &= 5(4)^3 \\ &= 5(64) \\ &= 320 \\ &(0, 320) \end{aligned}$$

c) $f(x) = -3(x-5)^4 - 2$

Reflection over x-axis
Vertical Stretch by factor of 3
Right 5
Down 2

$$\begin{aligned} f(0) &= -3(0-5)^4 - 2 \\ &\rightarrow (-5)^4 - 2 \\ &= -3(625) - 2 \end{aligned}$$

b) $f(x) = -\frac{1}{3}(x-4)^3 + 6$

Vertical Compression by factor of $\frac{1}{3}$
Shift Right 4
Up 6
Reflection over x-axis

$$f(0) = -\frac{1}{3}(0-4)^3 + 6$$

$$-\frac{1}{3}(-4)^3 + 6$$

$$-\frac{1}{3}(-64) + 6$$

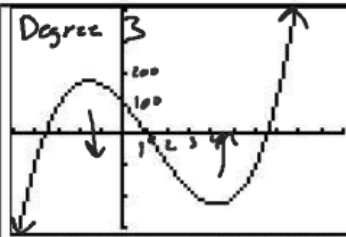
$$\frac{64}{3} + 6$$

$$\frac{64}{3} + \frac{18}{3} = \frac{82}{3}$$

Also find the x and y-intercepts of each graph

Degree of Polynomial is always 1 more than intervals of concavity

Y-intercept -75



[-5, 10] by [-300, 400]

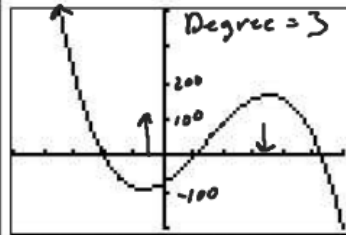
a) Intervals of concavity

2
Concave Down $(-\infty, 1.5)$
Concave up $(1.5, \infty)$

b) End Behavior

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow -\infty} f(x) = -\infty$$



[-5, 6] by [-200, 400]

a) Intervals of concavity 2

$(-\infty, 2)$ Concave up
 $(2, \infty)$ Concave Down

b) End Behavior

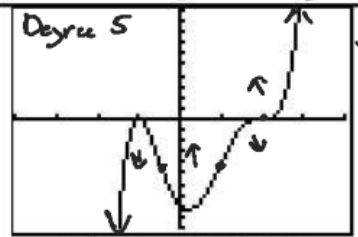
$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

Match the Polynomial Function with its graph.

1) $f(x) = 4x^3 - 16x^2 - 81x + 100$

3) $f(x) = -x^5 + 3x^4 + 5x^3 - 5x^2 + 6x + 8$



[-4, 4] by [-10, 10]

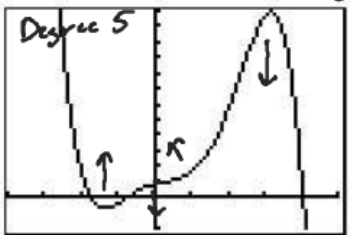
a) Intervals of concavity

4
Concave Down $(-\infty, -\frac{1}{2})$
Concave up $(-\frac{1}{2}, 1)$ $(2, \infty)$

b) End Behavior

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow -\infty} f(x) = -\infty$$



[-4, 5] by [-20, 120]

a) Intervals of concavity 4

b) End Behavior

$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

2) $f(x) = -7x^3 + 30x^2 + 50x - 75$

4) $f(x) = x^5 - 4x^4 + x^3 + 10x^2 - 4x - 8$

<p>Degree # of Linear Factors</p> <p>Degree odd End behaviors go in opposite direction. L.C. > 0</p> <p>Degree even Both end behaviors go same way L.C. > 0 up L.C. < 0 Down</p>	<p>Describe the end behavior of each function</p> <p>A) $f(x) = (x-3)(x+5)(x-1)$ Degree = 3 L.C. = 1 $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -\infty} f(x) = -\infty$</p> <p>C) $f(x) = (x-3)^2(x+5)(x-1)$ $(x-3)(x-3)(x+5)(x-1)$ Degree = 4 L.C. = 1 $\lim_{x \rightarrow \pm\infty} f(x) = \infty$</p> <p>B) $f(x) = (x-3)(\overset{(5-6x)}{\cancel{(6x-5)}}(x-1))$ Degree = 3 L.C. = -6 $\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -\infty} f(x) = \infty$</p> <p>D) $f(x) = (x-3)(5-6x)^3$ Deg = 4 L.C. < 0 (-216) $\lim_{x \rightarrow \pm\infty} f(x) = -\infty$</p>
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