

Activity 1.4 - Answer Key

Problem 1

Given the function $f(x) = 2x^2$, using interval notation describe where the function is increasing and decreasing

Interval of increase: $(0, \infty)$

Interval of decrease: $(-\infty, 0)$

Problem 2

Determine if the function $f(x) = x^3 + x^2$ is odd, even, or neither

To determine if the function $f(x) = x^3 + x^2$ is odd, even, or neither, we need to check the following:

- A function is **even** if $f(-x) = f(x)$ for all x in the domain.
- A function is **odd** if $f(-x) = -f(x)$ for all x in the domain.

Step 1: Calculate $f(-x)$

First, we find $f(-x)$:

$$f(-x) = (-x)^3 + (-x)^2$$

$$f(-x) = -x^3 + x^2$$

Step 2: Compare $f(-x)$ with $f(x)$ and $-f(x)$

Next, we compare $f(-x)$ with $f(x)$ and $-f(x)$:

$$f(x) = x^3 + x^2$$

$$-f(x) = -(x^3 + x^2) = -x^3 - x^2$$

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Step 3: Determine if the function is even, odd, or neither

Compare the results:

$$f(-x) = -x^3 + x^2$$

$$f(x) = x^3 + x^2$$

$$-f(x) = -x^3 - x^2$$

- $f(-x) \neq f(x)$, so the function is not even.
- $f(-x) \neq -f(x)$, so the function is not odd.

Conclusion

Since $f(-x) \neq f(x)$ and $f(-x) \neq -f(x)$, the function $f(x) = x^3 + x^2$ is **neither even nor odd**.

Problem 3

True or False: At a point on a graph where a function changes directions from increasing to decreasing, the function has a relative minimum.

False, at a point where a graph changes from increasing to decreasing, the function has a relative maximum.

Problem 4

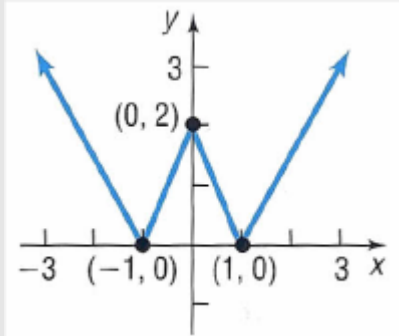
Is a circle a function, why or why not?

A circle is not a function as it fails the vertical line test.

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Problem 5

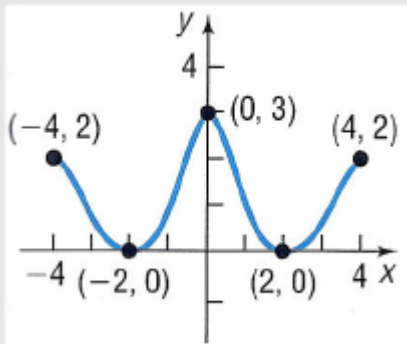
Find the minimum points of the graph:



The minimum points are $(-1, 0)$ and $(1, 0)$

Problem 6

Describe where the function is decreasing:



The function is decreasing on the intervals $(-4, -2) \cup (0, 2)$

Problem 7

Given the following piecewise function, find $f(0)$

$$f(x) = \begin{cases} 2x + 3 & x \leq 0 \\ -5x + 4 & x > 0 \end{cases}$$

$$0 \leq 0$$

$$\implies f(0) = 2(0) + 3$$

$$= 3$$

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Problem 8

Given $f(x) = x^2 + 3x$, find $f(x + 3)$

$$f(x + 3) = (x + 3)^2 + 3(x + 3)$$

$$= (x^2 + 6x + 9) + (3x + 9)$$

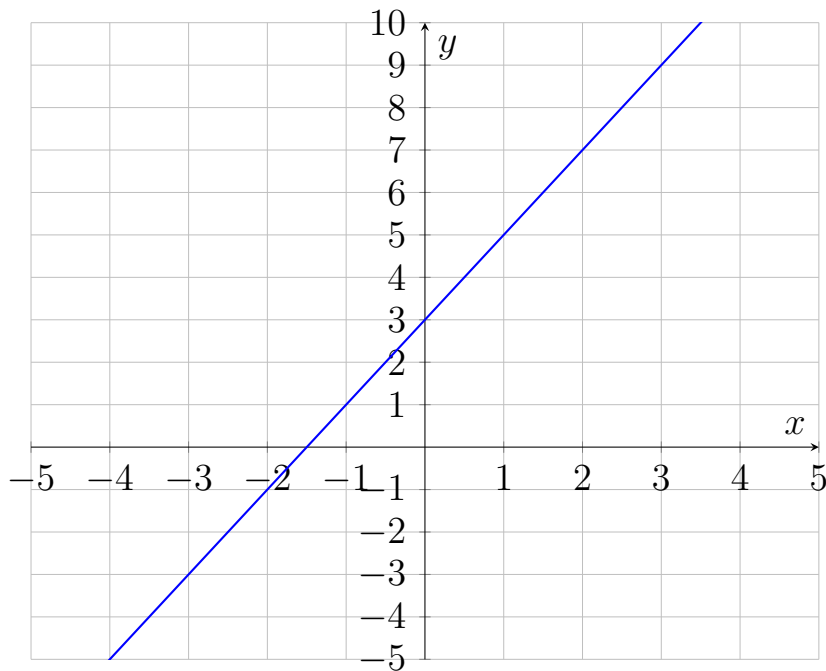
$$f(x + 3) = x^2 + 9x + 18$$

Problem 9

Draw a linear function of your choice.

Any valid linear function in the form $y = mx + b$. Below is the example

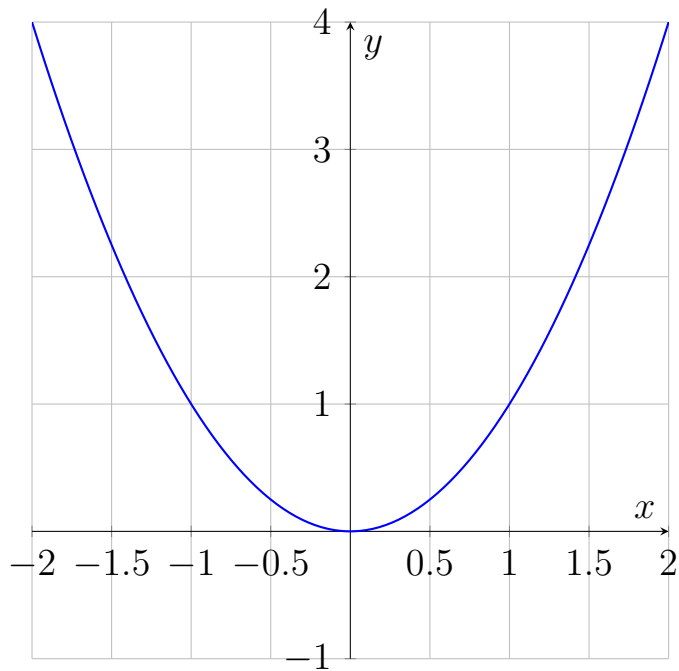
$$y = 2x + 3,$$



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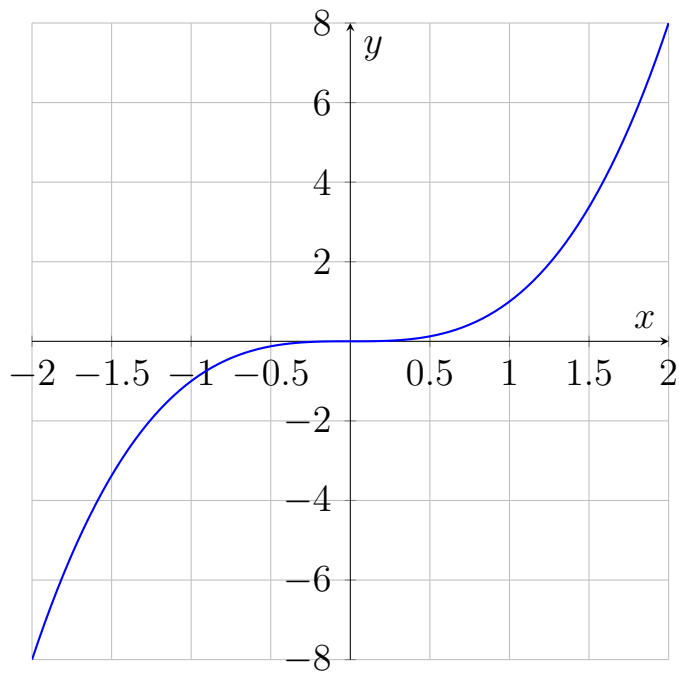
Problem 10

Draw x^2



Problem 11

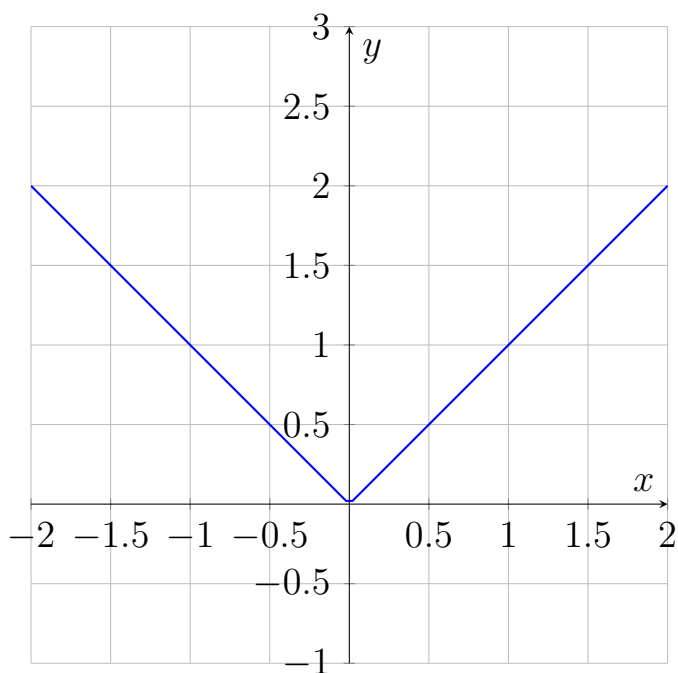
Draw x^3



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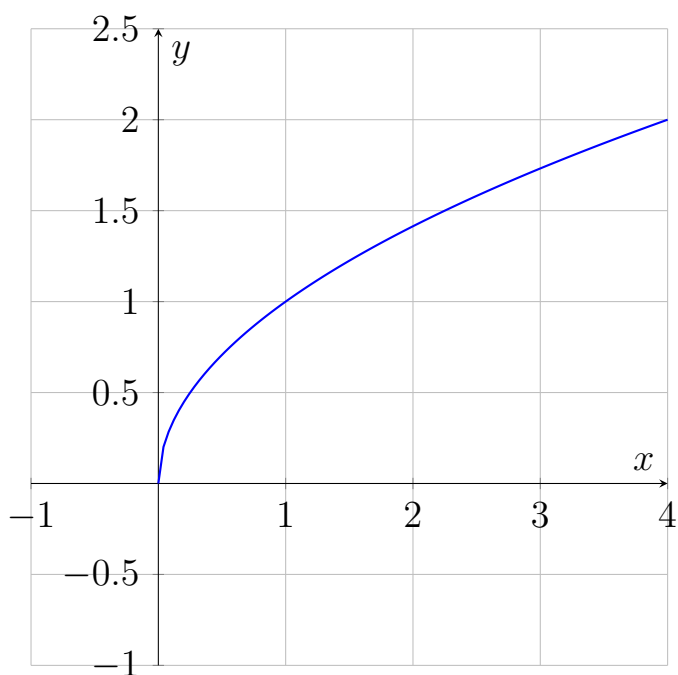
Problem 12

Draw $|x|$



Problem 13

Draw \sqrt{x}



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Problem 14

Draw $x^{1/3}$

