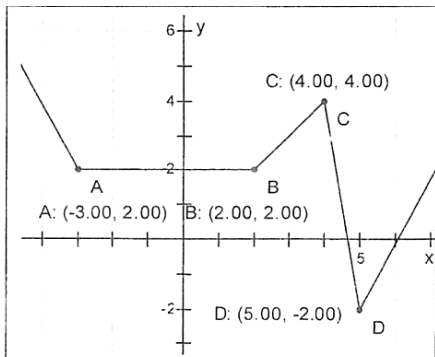


Aim: How do we graph the greatest integer function?

I. Do Now:

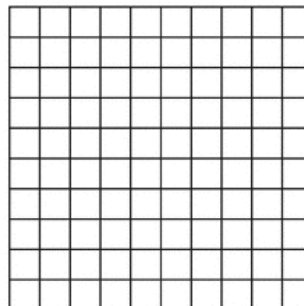
1. Given the graph below, find the open intervals where the graph is



- (a) increasing _____
- (b) decreasing _____
- (c) constant _____

2. Graph the piecewise function $f(x)$.

$$f(x) = \begin{cases} -1, & -1 \leq x < 0 \\ 0, & 0 \leq x < 1 \\ 1, & 1 \leq x < 2 \\ 2, & 2 \leq x < 3 \end{cases}$$



If the "pattern" in the graph above continues, what would the next line read?

II. Development

The graph in #2 represents a new function: _____

The notation is $f(x) = \lfloor x \rfloor$ or $f(x) = \llbracket x \rrbracket$ (Do not confuse this notation with absolute value: $|x|$.)

Each number in the domain is mapped to _____

The *Greatest Integer Function* is also called the *floor* of a number $\lfloor x \rfloor$

The *Least Integer Function* is also called the *ceiling* of a number $\lceil x \rceil$

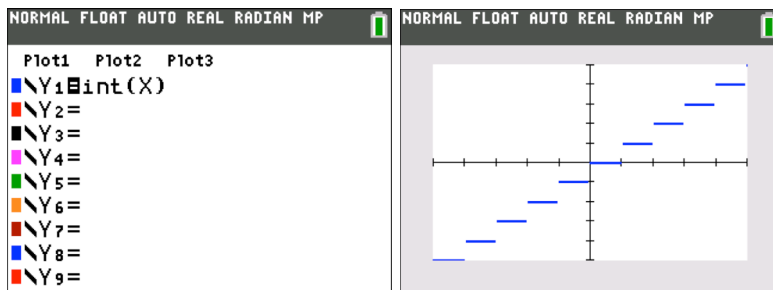
III. Applications.

Evaluate each:

- 3. $\lfloor 2.7 \rfloor =$ _____
- 4. $\lfloor 2.3 \rfloor =$ _____
- 5. $\lfloor 1.9 \rfloor =$ _____
- 6. $\lfloor 0.5 \rfloor =$ _____
- 7. $\lfloor 0 \rfloor =$ _____
- 8. $\lfloor -0.1 \rfloor =$ _____
- 9. $\lfloor -1.3 \rfloor =$ _____
- 10. $\lfloor 0.7 \rfloor + 2 =$ _____
- 11. $\lfloor 0.7 + 2 \rfloor =$ _____
- 12. $\lceil 2.7 \rceil =$ _____
- 13. $\lceil 2.3 \rceil =$ _____
- 14. $\lceil 1.1 \rceil =$ _____
- 15. $\lceil 0.5 \rceil =$ _____
- 16. $\lceil 0 \rceil =$ _____
- 17. $\lceil -0.1 \rceil =$ _____
- 18. $\lceil -1.6 \rceil =$ _____
- 19. $\lceil 0.7 \rceil + 2 =$ _____
- 20. $\lceil 0.7 + 2 \rceil =$ _____

To graph ceiling or floor functions on the graphing calculator:

Press **MATH**, NUM, 5: int(

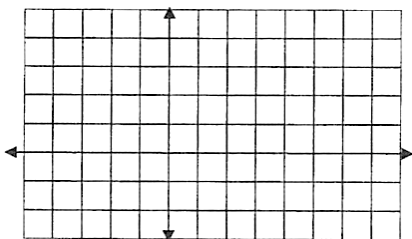


To graph the least integer function, enter: $Y_1 = -\text{int}(-X)$

Why does this expression work?

(In other words, explain why $\lceil x \rceil = -\lfloor -x \rfloor$.)

21. Graph $f(x) = \lfloor x \rfloor$



22. The cost of parking a car in a parking garage is \$5 for the first hour or part of an hour and \$3.50 for each additional hour or part of an hour. The least integer (ceiling) function can be used to model this situation, where C represents the total cost and x represents the number of hours.

$$C(x) = \$5.00 + \$3.50 \lceil x - 1 \rceil \text{ for } x > 0$$

Find the cost of parking a car in the garage for

- (a) 20 minutes
- (b) 1 hour
- (c) 3½ hours
- (d) 5 hours and 15 minutes

HW16 (do graphs on back of this sheet)

- Read page 34 • Graph $f(x) = \lfloor x \rfloor$
- p. 39: 91, 92
- Graph $f(x) = \begin{cases} x^2 - 1, & x < -1 \\ 3, & -1 \leq x < 2 \\ 3x - 2, & x \geq 2 \end{cases}$

