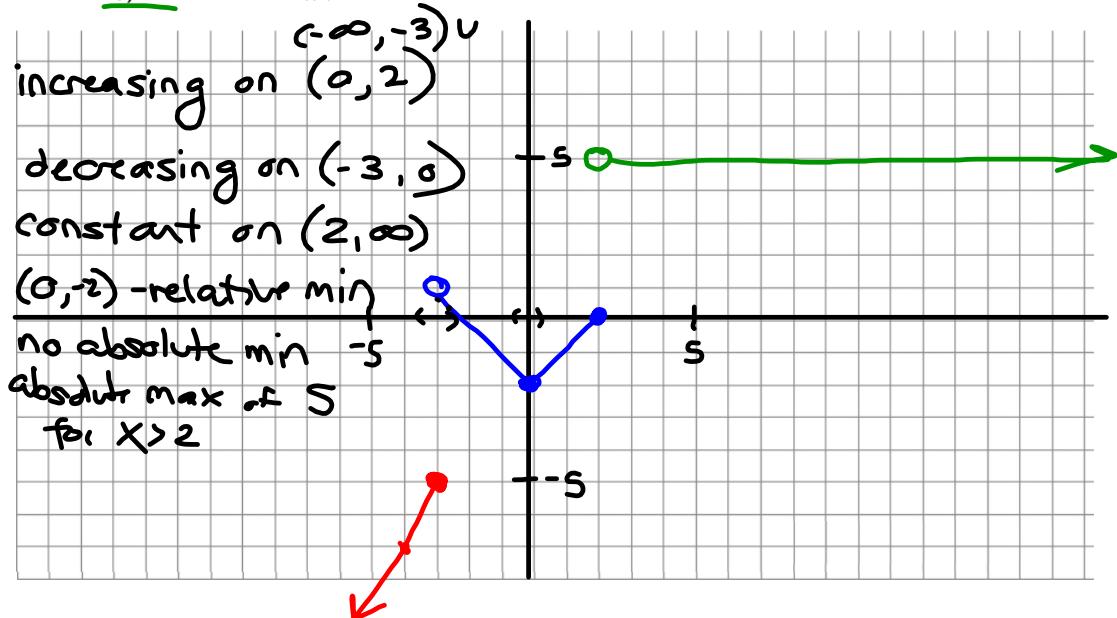


[Review](#)

6. Graph the piecewise function and state the intervals over which the function is increasing, decreasing, or constant. Where does the function have relative and/or absolute extrema?

$$f(x) = \begin{cases} 2x + 1, & x \leq -3 \\ |x| - 2, & -3 < x \leq 2 \\ 5, & x > 2 \end{cases}$$



$$\log_a b = c \iff a^c = b$$

$$\log_c \frac{\sqrt{x}y}{z^2}$$

$$\frac{3}{2} \log x + \frac{5}{2} \log y - 2 \log z$$

$$\log_{10}(\ln x) = 0 \quad 2^{5+x} = (2^5)^{x-4}$$

$$10^0 = \ln x \quad 2^{5+x} = 2^{5(x-4)}$$

$$1 = \log_e x$$

$$e^1 = x$$

$$5+x = 5(x-4)$$

$$\frac{\ln 2}{8}$$

$$\log_3(3x+6) - \log_3(x-6) = 2$$

$$\log_3 \frac{3x+6}{x-6} = 2$$

$$3^2 = \frac{3x+6}{x-6}$$

$$9(x-6) = 3x+6$$

$$a. K = \frac{\ln\left(\frac{11466.64}{8000}\right)}{6}$$

$$b. P(t) = P_0 e^{kt}$$

$$P(t) = 8000e^{kt}$$

$$c. P(10) = 8000e^{k \cdot 10}$$

$$d. \frac{\ln 2}{K}$$

$$\sum_{i=2}^{15} i = \underbrace{2+3+4+5}_{4 \text{ terms}} \\ (5-2)+1$$

10.2

$$36. \sum_{k=2}^{50} (2000 - 3k) =$$

$$S_n = \frac{n}{2} (a_1 + a_n)$$

↑ ↗ # of terms
 Sum of the first 1st term nth term
 n terms

$$S_{49} = \frac{49}{2} (1999 + 1850) \quad n = 49$$

$$= 94178$$

$$2000 - 3(2) + 2000 - 3(3) + \dots + 2000 - 3(50)$$

$$\begin{aligned} a_1 &= 2000 - 3(2) \\ &= 2000 - 6 \\ &= 1994 \end{aligned}$$

$$\begin{aligned} a_{49} &= 2000 - 3(50) \\ &= 2000 - 150 \\ &= 1850 \end{aligned}$$

Geometric Sequences/Series:10.3

Definition: A sequence is geometric if there is a number r , called the common ratio, such that $\frac{a_{n+1}}{a_n} = r$, or $a_{n+1} = a_n r$, for any integer $n \geq 1$.

The nth term of a geometric sequence is given by

$$a_n = a_1 r^{n-1}, \text{ for any integer } n \geq 1.$$

The sum of the first n terms of a geometric sequence is given by

$$S_n = \frac{a_1(1-r^n)}{1-r}, \text{ for any } r \neq 1.$$

When $|r| < 1$, the limit or sum of an infinite geometric series is given by

$$S_\infty = \frac{a_1}{1-r}$$

$$18, -6, 2, \frac{-2}{3}$$

common ratio: $-\frac{1}{3}$

$$2, -10, +50, -250, \dots$$

find the 9th term:

$$a_1 = 2; r = -5$$

$$a_9 = 2(-5)^{9-1} = \boxed{781250}$$

$$a_n = a_1 r^{n-1}$$

$$16 - 8 + 4 - 2 + \dots$$

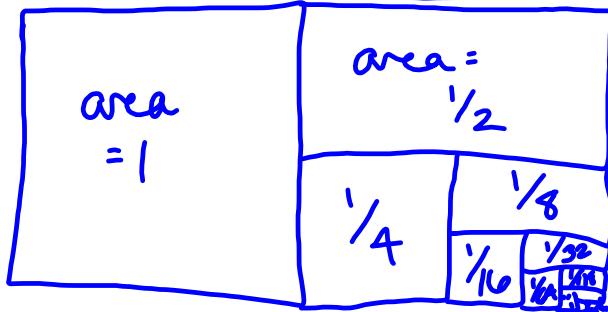
Find the sum of the first 10 terms.

$$S_n = \frac{a_1(1-r^n)}{1-r}$$

$$S_{10} = \frac{16\left(1 - \left(-\frac{1}{2}\right)^{10}\right)}{1 - \left(-\frac{1}{2}\right)} = \boxed{\frac{341}{32}}$$

$$\sum_{n=0}^{\infty} \left(\frac{1}{2}\right)^n = 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16} + \dots$$

$= \boxed{2}$



$$\sum_{n=0}^{\infty} \frac{1}{2^n} = 1 + \frac{1}{2} + \frac{1}{4} + \dots = 2$$

$$\frac{1}{1-\frac{1}{2}} = \frac{1}{\frac{1}{2}} = \frac{1}{\frac{1}{2}} = 1 \cdot \frac{2}{1} = 2$$

In general, when $|r| < 1$,
 the sum of an infinite geometric series is $S_{\infty} = \frac{a_1}{1-r}$
 (or $S_{\infty} = \frac{a_0}{1-r}$ if series starts w/ a_0)

$$100 - 10 + 1 - \frac{1}{10} + \frac{1}{100} - \dots$$

what is the sum of this infinite geometric series?

$$\begin{aligned} S_{\infty} &= \frac{a_1}{1-r} = \frac{100}{1 - \left(-\frac{1}{10}\right)} = \frac{100}{\frac{10}{10} + \frac{1}{10}} \\ &= \frac{100}{\frac{11}{10}} = \frac{100}{1} \cdot \frac{10}{11} = \boxed{\frac{1000}{11}} \end{aligned}$$

50.

$$\sum_{k=1}^{\infty} \frac{8}{3} \left(\frac{1}{2}\right)^{k-1}$$

$r = \frac{1}{2}$

$$= \frac{8}{3} + \frac{4}{3} + \frac{2}{3} + \dots \quad |\frac{1}{2}| < 1 \quad \checkmark$$

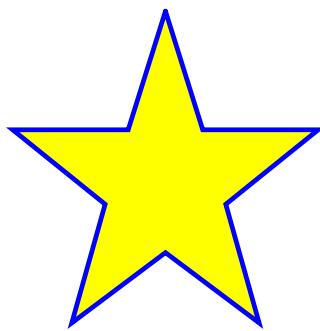
$$\begin{aligned} &= \frac{\frac{8}{3}}{1 - \frac{1}{2}} = \frac{\frac{8}{3}}{\frac{2}{2} - \frac{1}{2}} = \frac{\frac{8}{3}}{\frac{1}{2}} = \frac{\frac{8}{3} \cdot 2}{1} \\ &= \boxed{\frac{16}{3}} \end{aligned}$$

HW #10 (due Fri, Oct 24)

- 10.1 #7,9,23-31odd, #59,63,67
- 10.2 #9,15,19,21,25,29,35,37
- 10.3 #15,19,21,25,35,37,43,45,49,57
- 10.7 #1,7,21,27,31-39odd

Due Mon, Oct 27

- Final Exam Practice Problems



Quiz #5 on Matrices, Sequences, Series - Friday 10/24

Final Exam - 9:00am, Friday 10/31