Geometric Series & Sequences.

Since r = Annual Percentage Rate, use the letter "b" for "base" when talking about geometric series

$$S_n = a + ab + ab^2 + \cdots + ab^{n-1}$$

$$= \frac{a(1-b^n)}{1-b}$$

Nov 7-10:52 AM

Practice Test #3 Monday b4 Thanksgiving.
Practice Test #4 Wednesday, next week.
Midterm re-take Tuesday, B4 Thanksgiving

§8.1 #43

$1, 8, 27, 64, \ldots$ $f(k) = k^3 = a_k$

$k=1:$ 1 $f(k)=k, f(k)=2k-1, f(k)=k^2, f(k)=k^3$

$k=2:$ 8 $f(k)=2(k)+4, f(k)=k^3$

$k=3:$ $3^3=27$ ✓

Guess a formula for a_k

$a_1 = 1$

$a_2 = 8 = 2^3$

$\pi, 4\pi, 9\pi, 16\pi, \ldots$ #46

$a_k = k^2\pi$

47 $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \ldots$

$a_k = \frac{1}{2^k}$ $a_1 = \frac{1}{2^1} = \frac{1}{2}$ Nowp

$a_k = \frac{1}{k^2}$ $a_1 = \frac{1}{1^2}$, $a_2 = \frac{1}{2^2} = \frac{1}{4}$ Nowp

$a_1 = \frac{1}{1} = \frac{1}{2^{1-1}} = \frac{1}{2^0}$

$a_2 = \frac{1}{2^1}$ $a_k = \frac{1}{2^{k-1}}$

$a_3 = \frac{1}{2^2}$

Recall from last time!

$$\sum_{k=-7}^{50} k^2 = (-7)^2+(-6)^2+(-5)^2+\cdots+(-1)^2+0^2 + 1^2+2^2+\cdots+50^2$$

$$= \underbrace{7^2+6^2+\cdots+1^2}_{\sum_{k=1}^{7} k^2}+0^2+\underbrace{1^2+2^2+\cdots+50^2}_{\sum_{k=1}^{50} k^2}$$

$$\sum_{k=1}^{7} k^2 + \sum_{k=1}^{50} k^2$$

$$\begin{array}{r} {}^{2}17 \\ \times\ 3 \\ \hline 51 \end{array}$$

$$= \frac{7(7+1)(2(7)+1)}{6} + \frac{50(50+1)(2(50)+1)}{6}$$

$$= \frac{7\overset{4}{\cancel{(8)}}\overset{5}{\cancel{(15)}}}{\underset{\underset{1}{\cancel{3}}}{\cancel{6}}} + \frac{\overset{25}{\cancel{50}}\overset{17}{\cancel{(51)}}(101)}{\underset{\underset{1}{\cancel{2}}}{\cancel{6}}} = 7(4)(5)+(25)(17)(101)$$

$$= 43065$$

$$\boxed{\sum_{k=-7}^{50} k^2 = \sum_{k=1}^{58} (k-8)^2} = \sum_{k=1}^{58}\left(k^2 - 16k + 64\right)$$

$$\sum 1 = n$$

$$\sum k = \frac{n(n+1)}{2}$$

$$\sum k^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\sum k^3 = \left(\frac{n(n+1)}{2}\right)^2$$

$$(-7)^2 + (-6)^2 + \cdots + (50)^2$$

$$\boxed{= \sum_{k=1}^{58} k^2 - 16\sum_{k=1}^{58} k + 64\sum_{k=1}^{58} 1}$$

$$\begin{array}{r} {}^{3}58 \\ \times\ 64 \\ \hline 232 \\ 3480 \\ \hline 3712 \end{array}$$

$$* \quad = \frac{58(58+1)(2(58)+1)}{6} - 16\frac{58\,(58+1)}{2} + 64(58)$$

$$= \frac{\overset{29}{\cancel{58}}(59)\overset{39}{\cancel{(117)}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{6}}} \cancel{- 16\cdot\frac{\overset{8}{16}(17)}{\underset{1}{2}}} + 3712$$

$$= 29(59)(39) - \cancel{16(8)(17)} + 3712$$

$$= 66729 - \cancel{2176} + 3712$$

$$= \sum_{k=-7}^{50} k^2$$

Hand-work fell short.

43065

$$\sum_{k=1}^{58} (k-8)^2$$

43065

C4 Test Wednesday

Find the inverse of $g(x) = -5^{1-x} + 7$

$-5^{1-y} + 7 = x$

$-5^{1-y} = x - 7$

$5^{1-y} = 7 - x$

$\log_5(5^{1-y}) = \log_5(7-x)$

$1 - y = \log_5(7-x)$

$-y = \log_5(7-x) - 1$

$y = 1 - \log_5(7-x) = g^{-1}(x) = h(x)$

Find the inverse of $h(x) = 1 - \log_5(7-x)$

$1 - \log_5(7-y) = x$

$-\log_5(7-y) = x - 1$

$\log_5(7-y) = 1 - x$

$5^{\log_5(7-y)} = 5^{1-x}$

$7 - y = 5^{1-x}$ $\qquad h(x) = 1 - \log_5(7-x)$

$-y = 5^{1-x} - 7$

$y = 7 - 5^{1-x} = h^{-1}(x) = g(x)$

$g(h(x)) = 7 - 5^{1-h(x)}$

$= 7 - 5^{1-(1-\log_5(7-x))}$

$= 7 - 5^{1-1+\log_5(7-x)}$

$= 7 - 5^{\log_5(7-x)}$

$= 7 - (7-x)$

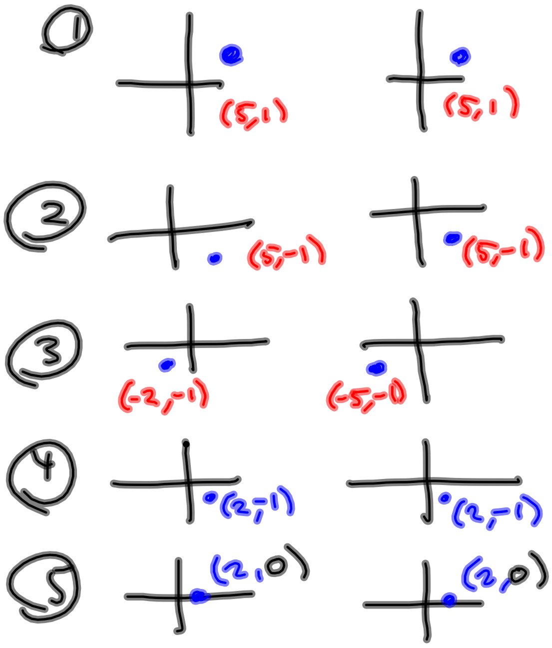
$= 7 - 7 + x$

$= x$

graph $h(x) = 1 - \log_5(7-x)$

$7-x \rightarrow -x+7$ $\qquad$ $7-x \rightarrow -(x-7)$

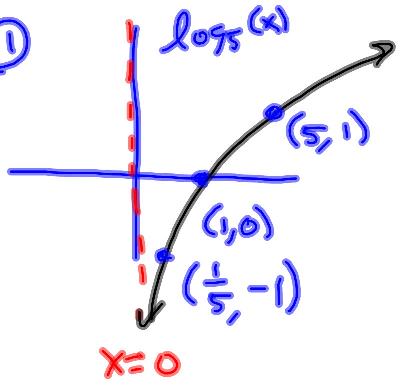
$f(x) = \log_5(x)$



① $\log_5(x)$	① $\log_5(x)$
② $-\log_5(x)$	② $-\log_5(x)$
③ $-\log_5(x+7)$	③ $-\log_5(-x)$
④ $-\log_5(-x+7)$	④ $-\log_5(-(x-7))$
⑤ $-\log_5(-x+7)+1$	⑤ $-\log_5(-(x-7))+1$

1 $\log_5(x)$	1 $\log_5(x)$
2 $-\log_5(x)$	2 $-\log_5(x)$
3 $-\log_5(x+7)$	3 $-\log_5(-x)$
4 $-\log_5(-x+7)$	4 $-\log_5(-(x-7))$
5 $-\log_5(-x+7)+1$	5 $-\log_5(-(x-7))+1$

1



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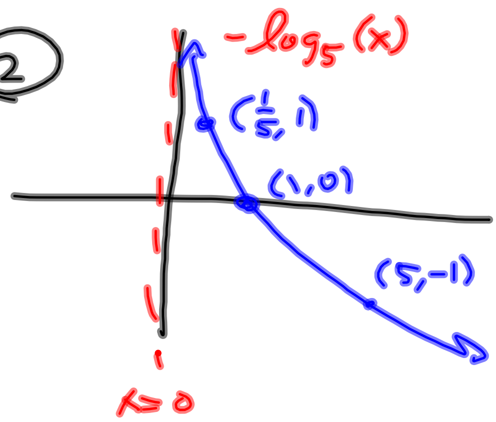
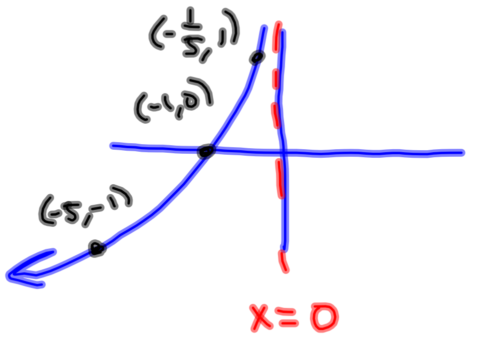
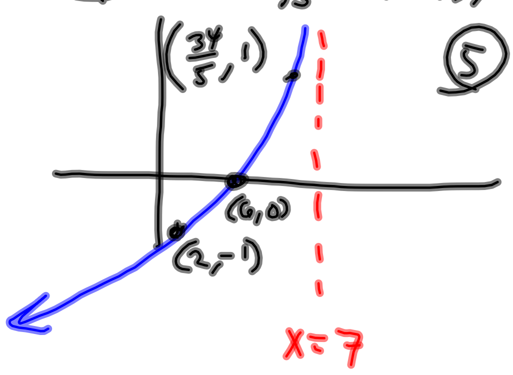


3 $-\log_5(-x)$



4 $-\log_5(-(x-7))$



5 Move up 1.