Midterm 2 #3

$w^2 - 7w - 30 = 0$

$(w+3)(w-10) = 0$

$w+3=0$ or $w-10=0$

$\boxed{w=-3 \qquad w=10}$

$e^{2x} - 7e^x - 30 = 0$

$(e^x)^2 - 7(e^x) - 30 = 0$

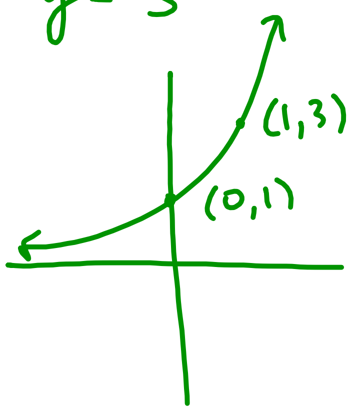
$w = e^x$

$e^x = -3$ or $e^x = 10$

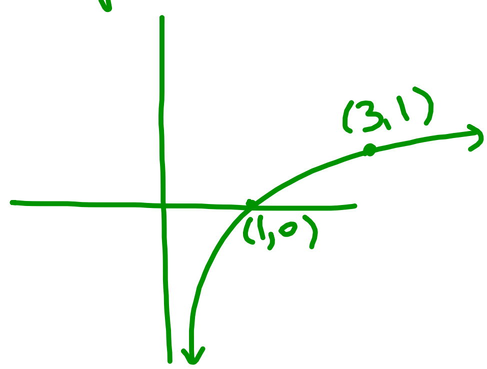
N.S.

$x = \ln 10$

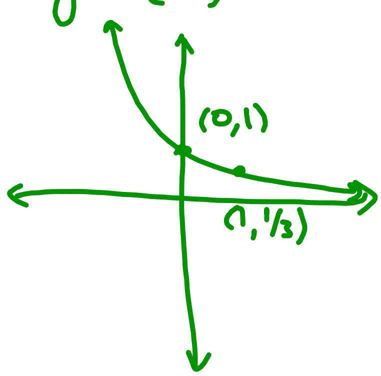
$y = 3^x$



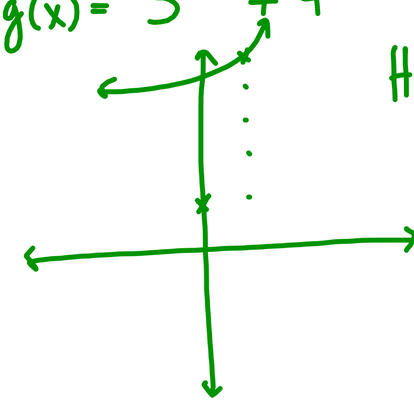
$y = \log_3 x$



$y = \left(\frac{1}{3}\right)^x = 3^{-x}$



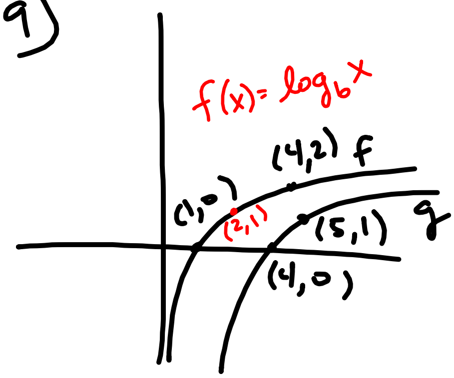
$g(x) = 3^{x-1} + 4$



HA: $y=4$

Midterm 2 logarithmic curves.

#9)



base of f is 2

$1 = \log_b 2$

$b^1 = 2$

$b = 2$

$\Rightarrow f(x) = \log_2 x$

$g(x) = \log_2 (x-3)$

Mid 2 # 11

$$\frac{5x+13}{(x+3)^2} = \frac{A}{x+3} + \frac{B}{(x+3)^2}$$

$$\frac{5x+13}{(x+3)^2} = \frac{A(x+3)+B}{(x+3)^2} \Rightarrow 5x+13 = A(x+3)+B$$

$$5x+13 = Ax + (3A+B)$$

$$5 = A \qquad 13 = 3A+B$$

$$13 = 15 + B$$

$$B = -2$$

$$\frac{3x}{(x+1)(x-4)} = \frac{A}{x+1} + \frac{B}{x-4}$$

$$\frac{3x}{(x+1)(x-4)} = \frac{A(x-4)+B(x+1)}{(x+1)(x-4)} \Rightarrow 3x = A(x-4)+B(x+1)$$

choose

$x=4$: $\quad 12 = 5B \Rightarrow B = 12/5$

$x=-1$: $\quad -3 = A(-5) \Rightarrow A = 3/5$

Pascal's Triangle

$$\begin{array}{ccccccccc} & & & & 1 & & & & \\ & & & 1 & & 1 & & & \\ & & 1 & & 2 & & 1 & & \\ & 1 & & 3 & & 3 & & 1 & \\ 1 & & 4 & & 6 & & 4 & & 1 \end{array}$$

$$(a+b)^4 = 1a^4 + 4a^3b^1 + 6a^2b^2 + 4ab^3 + 1b^4$$

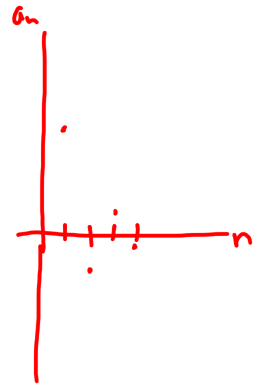
$$(3x-2y)^4 = (3x)^4 + 4(3x)^3(-2y) + \underbrace{6(3x)^2(-2y)^2} + 4(3x)(-2y)^3 + (-2y)^4$$

coefficient of x^2y^2 is $6(3^2(-2)^2) = 216$

sums of geometric sequences:

ex $\overset{n=1}{4}, \overset{n=2}{-\frac{4}{3}}, \frac{4}{9}, \frac{-4}{27}, \ldots$

$r = -\frac{1}{3}$ $\quad a_n = 4\left(\frac{-1}{3}\right)^{n-1}$



$$\sum_{n=1}^{20} 4\left(\frac{-1}{3}\right)^{n-1} = 4\left(\frac{1-\left(\frac{-1}{3}\right)^{20}}{1-(-1/3)}\right)$$

$$= \frac{4\left(1-\frac{1}{3^{20}}\right)}{4/3}$$

$$= \cancel{4}\left(1-\frac{1}{3^{20}}\right)\left(\frac{3}{\cancel{4}}\right) = 3\left(1-\frac{1}{3^{20}}\right)$$

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

where $a_i = a_1 r^{i-1}$

ex $$\sum_{n=0}^{8} 6\left(\frac{3}{5}\right)^n = 6 + \sum_{n=1}^{8} 6\left(\frac{3}{5}\right)^n = 6 + \sum_{n=1}^{8} 6\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)^{n-1}$$

$$= 6 + \sum_{n=1}^{8}\left(\frac{18}{5}\right)\left(\frac{3}{5}\right)^{n-1}$$

$$= 6 + \frac{18}{5}\left(\frac{1-\left(\frac{3}{5}\right)^8}{1-\frac{3}{5}}\right)$$

ex $$\sum_{n=1}^{\infty} 7\left(\frac{2}{9}\right)^n \qquad n = (n-1)+1$$

$$= \sum_{n=1}^{\infty} 7\left(\frac{2}{9}\right)^1\left(\frac{2}{9}\right)^{n-1}$$

$$= \frac{7\left(\frac{2}{9}\right)}{1-2/9} = \frac{14/9}{7/9} = 2$$

formula:

$$\sum_{n=1}^{\infty} a_1 r^{n-1} = \frac{a_1}{1-r}$$

$|r| < 1$

ex $$\sum_{m=1}^{\infty} 2\left(\frac{1}{5}\right)^{m+3}$$

$m+3 = (m-1)+4$

$$\left(\frac{1}{5}\right)^{m+3} = \left(\frac{1}{5}\right)^{m-1}\left(\frac{1}{5}\right)^4$$

$$= \sum_{m=1}^{\infty}\left[2\left(\frac{1}{5}\right)^4\right]\left(\frac{1}{5}\right)^{m-1}$$

$$= \frac{2\left(\frac{1}{5}\right)^4}{1-\frac{1}{5}} = \frac{\frac{2}{5^4}}{\frac{4}{5}} = \frac{2}{5^4}\cdot\frac{5}{4} = \frac{2}{5^3\cdot 4} = \frac{1}{2(5^3)} = \frac{1}{250}$$