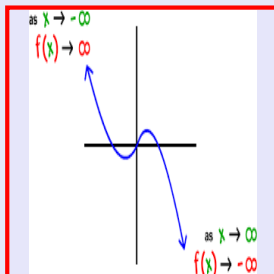
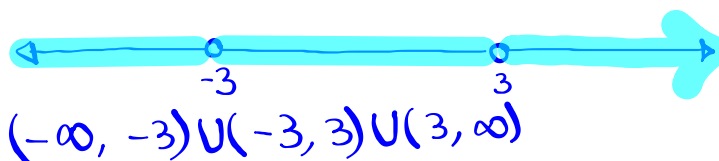


Math 245
Spring 2022
Lecture 43



Consider $f(x) = \frac{(4-x)(x+2)}{(x+3)(x-3)}$

1) Domain: All reals except ± 3



2) V.A. $\rightarrow x = -3, x = 3$ H.A. $y = \frac{-1}{1} = -1$

$$f(x) = \frac{-x^2 + \dots}{x^2 + \dots}$$

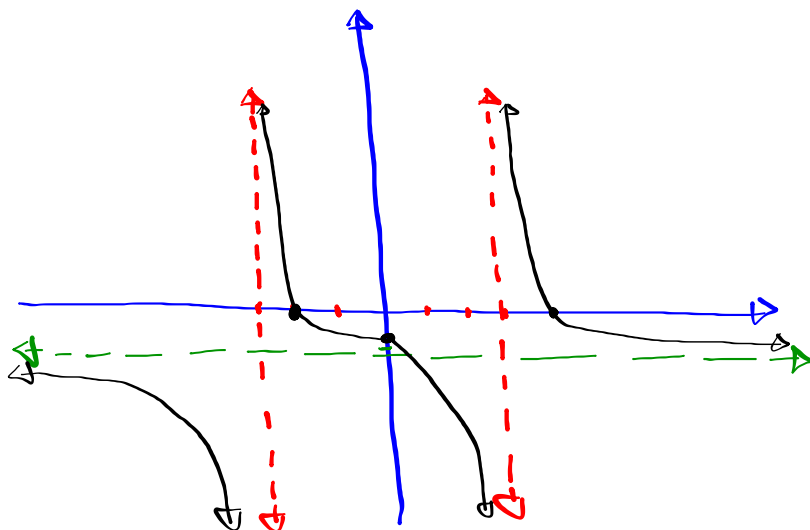
3) Y-Int $(0, \frac{8}{9})$, x-Int $(4, 0), (-2, 0)$

$x=4 \rightarrow y=$

$x=2 \rightarrow y=$

$x=-1 \rightarrow y=$

$x=-4 \rightarrow y=$



$f(x) > 0$ $(-\infty, -2) \cup (3, 4)$ above x-axis

$f(x) < 0$ $(-\infty, -3) \cup (-2, 3) \cup (4, \infty)$ below x-axis

use Your calc to find

1) ${}^7C_5 = \frac{7!}{5! \cdot (7-5)!} = \frac{7 \cdot 6 \cdot 5!}{5! \cdot 2!} = \boxed{21}$

2) $\binom{9}{2} = \frac{9!}{2! \cdot (9-2)!} = \frac{9!}{2! \cdot 7!} = \frac{9 \cdot 8 \cdot 7!}{2 \cdot 1 \cdot 7!} = \boxed{36}$

3) Expand $(a+b)^4$

$\binom{4}{0}a^4b^0 + \binom{4}{1}a^3b^1 + \binom{4}{2}a^2b^2 + \binom{4}{3}a^1b^3 + \binom{4}{4}a^0b^4$

$\binom{4}{0}=1$, $\binom{4}{1}=4$, $\binom{4}{2}=6$, $\binom{4}{3}=4$, $\binom{4}{4}=1$

$1a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + 1b^4$

$\boxed{1 \quad 4 \quad 6 \quad 4 \quad 1}$ 5th row in Pascal triangle

Expand $(a+b)^6$

1) 6+1 terms

2) Sum of exponents on each term = 6

$$\binom{6}{0}a^6b^0 + \binom{6}{1}a^5b^1 + \binom{6}{2}a^4b^2 + \binom{6}{3}a^3b^3 + \binom{6}{4}a^2b^4 + \binom{6}{5}a^1b^5 + \binom{6}{6}a^0b^6$$

$$\binom{6}{0}=1, \quad \binom{6}{1}=6, \quad \binom{6}{2}=15, \quad \binom{6}{3}=20$$

$$\binom{6}{4}=15, \quad \binom{6}{5}=6, \quad \binom{6}{6}=1$$

$$1a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + 1b^6$$

1	6	15	20	15	6	1
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7th row
of
Pascal Triangle

Find the first 4 terms of $(a+b)^{10}$.

$$\binom{10}{0}a^{10}b^0 + \binom{10}{1}a^9b^1 + \binom{10}{2}a^8b^2 + \binom{10}{3}a^7b^3$$

$$\binom{10}{0}=1 \quad \binom{10}{1}=10 \quad \binom{10}{2}=45 \quad \binom{10}{3}=120$$

$$1a^{10}b^0 + 10a^9b^1 + 45a^8b^2 + 120a^7b^3 + \dots$$

$$= a^{10} + 10a^9b + 45a^8b^2 + 120a^7b^3$$

Find the 4th term of $(a+b)^{12}$

$$\binom{12}{0} a^{12} b^0 \quad \binom{12}{1} a^{11} b^1 \quad \binom{12}{2} a^{10} b^2 \quad \binom{12}{3} a^9 b^3$$

4th term $\binom{12}{3} a^9 b^3 = 220 a^9 b^3$

Find the 6th term of $(a+b)^{15}$

$$\binom{15}{5} a^{10} b^5 = 3003 a^{10} b^5$$

Find 7th term of $(a + 2b)^{10}$

$$\begin{aligned} \binom{10}{6} (a)^4 (2b)^6 &= 210 a^4 \cdot (64 b^6) \\ &= 210 \cdot 64 a^4 b^6 \\ &= 13440 a^4 b^6 \end{aligned}$$

Find the 6th term of $(\underline{3x} - \underline{2y})^9$

$\begin{array}{cc} \uparrow & \uparrow \\ a & b \end{array}$

$$\binom{9}{5} (\overset{\boxed{4}}{3x})^4 (-2y)^5 = 126 \cdot (81x^4) \cdot (-32y^5)$$

$$= \underline{126(81)(-32)} x^4 y^5$$

Continue working
on SG.

$$= \boxed{-326592 x^4 y^5}$$