Reminder: 12.6 Notes

Factorial: $4! = (4)(3)(2)(1) \rightarrow 4! = 24$

$n! = n(n-1)(n-2)\cdots(1)$

$0! = 1$ (special definition)

NEW!! 12.6 notes

Factorial in graphing calculator:

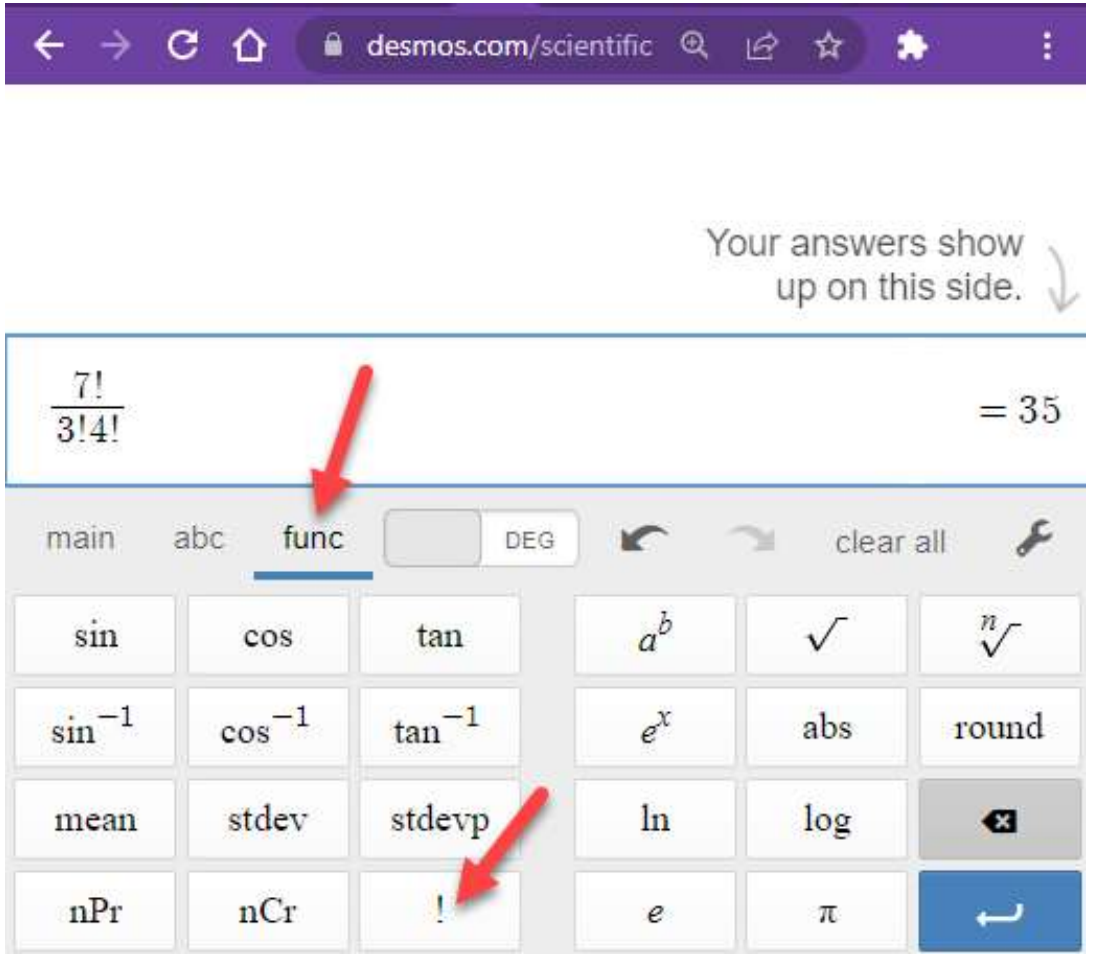
MATH ◀ ◀ PROB 4: !

NEW!! 12.6 notes

Factorial in graphing calculator:

MATH ◀◀ PROB 4: !

OR use the Desmos scientific calculator func



Binomial coefficient: for $(a+b)^n$

overall exponent (given) →

Exponent for "b" when expanding each term →

$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

Exponent for "b" when expanding

Exponent for "a"

NEW!! 12.6 notes

Binomial coefficient example:

$$\binom{7}{3}(2x)^4(-y)^3$$

$$\frac{7!}{3!4!}(2x)^4(-y)^3 = \frac{7\cdot6\cdot5\cdot\cancel{4!}}{\cancel{3\cdot2\cdot1\cdot4!}}\cdot 2^4x^4\cdot -y^3$$

$$= 35\cdot 16x^4\cdot -y^3$$

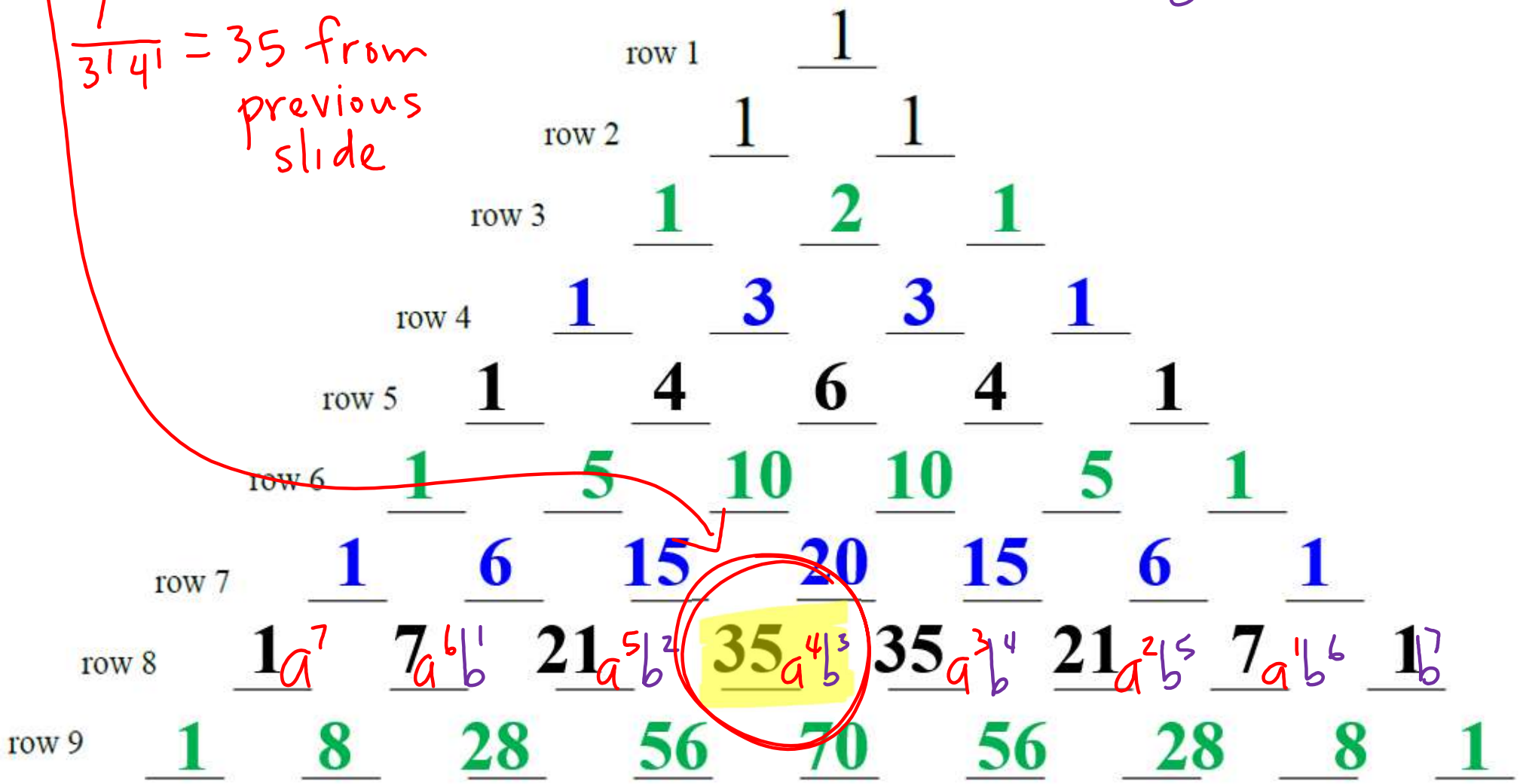
Combine into one coefficient

$$= \boxed{-560x^4y^3}$$

$$\binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$\binom{7}{3}(2x)^4(-y)^3$$ → represents 4th term of $(2x-y)^7$

$\frac{7!}{3!4!} = 35$ from previous slide



↓No calculator

12.6 #1-4, 11,12, 17-19, 27-29, 33

(Note: only use Pascal's Triangle for #2 and #12)

4. To expand $(a+b)^n$, we can use the _____ Theorem. Using this theorem, we find the expansion

$$(a+b)^4 = \binom{\quad}{\quad} a^4 + \binom{\quad}{\quad} a^3b + \binom{\quad}{\quad} a^2b^2 + \binom{\quad}{\quad} ab^3 + \binom{\quad}{\quad} b^4$$

Answer

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

$$\frac{4!}{0!4!} \quad \frac{4!}{1!3!} \quad \frac{4!}{2!2!} \quad \frac{4!}{3!1!} \quad \frac{4!}{4!0!}$$

same

Same = 1

↓No calculator

12.6 #1-4, 11,12, 17-19, 27-29, 33

(Note: only use Pascal's Triangle for #2 and #12)

11. $(x^2y - 1)^5$ **Change the instructions to "use Binomial Theorem"**

Set up

decreasing pattern

Increasing pattern

$$\binom{5}{0}(x^2y)^5(-1)^0 + \binom{5}{1}(x^2y)^4(-1)^1 + \binom{5}{2}(x^2y)^3(-1)^2 \cdots$$

$$\cdots + \binom{5}{3}(x^2y)^2(-1)^3 + \binom{5}{4}(x^2y)^1(-1)^4 + \binom{5}{5}(x^2y)^0(-1)^5$$

see next slide↓

$$= \frac{5!}{0!5!} \cdot x^{10} y^{5} \cdot 1 + \frac{5!}{1!4!} x^{8} y^{4} \cdot -1 + \frac{5!}{2!3!} x^{6} y^{3} \cdot 1 + \cdots \text{etc}$$

↓ 1st term always = 1

combine — ok to solve by hand or with a calculator

$$= 1x^{10}y^{5} + -5x^{8}y^{4} + 10x^{6}y^{3} + \text{etc}\ldots$$

12.6 CHECK EVENS

12. $99+70\sqrt{2}$

18. 56

28. $16A^4+32A^3B^2+24A^2B^4+8AB^6+B^8$

More homework examples will be posted after class on Monday!!!