

Solve for x. Find an exact answer algebraically.

[Review](#)

$$f(b) = f(a)$$

$$\Rightarrow b = a$$

$$4^{5x-3} = 64$$

$$4^{5x-3} = 4^3$$

$$5x-3 = 3$$

$$5x = 6$$

$$x = \frac{6}{5}$$

These are the only formulas you will be given on the final. Make sure you know any and all other formulas (logs, exponents, parabola vertex, etc.) AND make sure you know what the variables in these mean and when to use which.

$a_{n+1} = a_n \oplus d$ $a_n = a_1 \oplus (n-1)d$ $S_n = \frac{n}{2}(a_1 \oplus a_n)$ $a_n = a_1 r^{n-1}$ $S_n = \frac{a_1(1-r^n)}{1-r}$	<p>arithmetic</p> <p>geometric</p>	$S_\infty = \frac{a_1}{1-r}$ $(a+b)^n = \sum_{k=0}^n \binom{n}{k} a^{n-k} b^k$ $\binom{n}{k} = \frac{n!}{k!(n-k)!}$ $P(t) = P_0 e^{kt}$
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Solve the system of equations:

[Review](#)

$$\begin{cases} p+q+r=1 \\ p+2q+3r=4 \\ 4p+5q+6r=7 \end{cases}$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 \\ 4 & 5 & 6 & 7 \end{array} \right] \xrightarrow{\substack{R_2 + (-1)R_1 \\ R_3 + (-4)R_1}}$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 1 & 2 & 3 \end{array} \right] \xrightarrow{R_3 + (-1)R_2} \left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 \end{array} \right]$$

row of all zeros
⇒ infinitely many solutions

$$p+q+r=1$$

$$q+2r=3 \Rightarrow q = -2r+3$$

$$p = -q - r + 1$$

$$= -(-2r+3) - r + 1 = 2r - 3 - r + 1 = r - 2$$

$(r-2, -2r+3, r)$

Find Fraction Notation.

$$52. \quad 0.222\dots = 0.\overline{2}$$

$$= 0.2 + 0.02 + 0.002 + 0.0002 + \dots$$

$$= 2 \cdot \frac{1}{10} + 2 \cdot \frac{1}{100} + 2 \cdot \frac{1}{1000} + 2 \cdot \frac{1}{10000} + \dots$$

$$2 \left(\frac{1}{10}\right)^1 + 2 \cdot \left(\frac{1}{10}\right)^2 + 2 \left(\frac{1}{10}\right)^3 + 2 \left(\frac{1}{10}\right)^4 + \dots$$

Infinite geometric series w/ common ratio of $r = \frac{1}{10}$

$$S_{\infty} = \frac{a_1}{1-r} = \frac{2/10}{1-1/10} = \frac{2/10}{\frac{10}{10} - \frac{1}{10}} = \frac{2/10}{9/10} = \frac{2}{10} \cdot \frac{10}{9} = \boxed{\frac{2}{9}}$$

$$54. \quad 6.1\overline{616161}$$

$$\begin{array}{ll} 6.1 & 6.1 \\ + 0.061 & + 6.1 \times 10^{-2} \\ + 0.00061 & + 6.1 \times 10^{-4} \\ + 0.0000061 & + 6.1 \times 10^{-6} \\ + \dots & + \dots \end{array}$$

common ratio: $10^{-2} = \frac{1}{100}$

$$S_{\infty} = \frac{a_1}{1-r} = \frac{6.1}{1-\frac{1}{100}} = \frac{6\frac{1}{10}}{\frac{100}{100} - \frac{1}{100}} = \frac{6\frac{1}{10}}{\frac{99}{100}} = \frac{6\frac{1}{10} \cdot 100}{99} = \boxed{\frac{610}{99}}$$

10.3

58. Someone offers you a job for the month of February (28 days)
 You will be paid \$0.01 the 1st day,
 \$0.02 the 2nd day, \$0.04 the 3rd day,
 doubling your previous day's
 salary each day.

$$S_n = \frac{a_1(1-r^n)}{1-r} = \frac{0.01(1-2^{28})}{1-2} = -0.01(1-2^{28})$$

$$= (0.01)(2^{28}) - 0.01$$

Gimme
that
job!

\$2,684,354.55

10.7 The Binomial Theorem

Expansion of $(a + b)^n$

$$(a + b)^0 = 1$$

$$(a + b)^1 = a + b$$

$$(a + b)^2 = a^2 + 2ab + b^2$$

$$(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$

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

$$(a + b)^5 = a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5$$

What patterns do you see?

$(a+b)^n$ has $n+1$ terms

1st & last terms of $(a+b)^n$ have exponent of n
 exponents on a decrease from n to 0

exponents on b increase from 0 to n

sum of exponents on any term is n

coefficients for a^n & b^n are 1

coefficients for 2nd & 2nd to last terms are n

$$8. (2x-3y)^5 \quad a=2x; b=-3y; n=5$$

$$\begin{array}{ccccccc} & & & & & & 1 \\ & & & & & & 1 & 2 & 1 \\ & & & & & & 1 & 3 & 3 & 1 \\ & & & & & & 1 & 4 & 6 & 4 & 1 \\ & & & & & & 1 & 5 & 10 & 10 & 5 & 1 \end{array}$$

$$1(2x)^5(-3y)^0 + 5(2x)^4(-3y)^1 + 10(2x)^3(-3y)^2 + 10(2x)^2(-3y)^3 + 5(2x)^1(-3y)^4 +$$

$$+ 1(2x)^0(-3y)^5$$

$$32x^5 - 240x^4y + 720x^3y^2 - 1080x^2y^3 + 810xy^4 - 243y^5$$

Binomial Coefficients

$$\binom{n}{k} = \text{"n choose k"}$$

= the total # of combinations of n objects taken k at a time

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

"n factorial"

$$n! = n(n-1)(n-2)\dots 2 \cdot 1$$

$$5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$

Given a class of 11 students,
how many groups of 3 can we make?

$$\binom{11}{3} = \frac{11!}{3!(11-3)!} = \frac{11!}{3!8!}$$

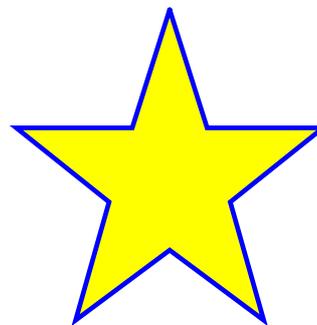
$$= \frac{11 \cdot \cancel{10}^5 \cdot \cancel{9}^3 \cdot \cancel{8!}}{\cancel{3} \cdot \cancel{2} \cdot 1 \cdot \cancel{8!}} = 165$$

HW #10 (due Fri, Oct 24)

- 10.1 #7,9,23-31 odd, #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

HW #11 (due Mon, Oct 27)

- 10.7 #1,7,21,27,31-39 odd
- Final Exam Practice Problems



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

Review session - 3:30pm, Thursday 10/30

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

Note that your final exam average can replace your lowest test grade!

BRING YOUR TEXTBOOKS TO THE FINAL EXAM!