**SOL Review Topic 6: Other!**

Sequences and Series, Statistics, Composition of Functions, Variation, Inverses, Properties

Sequences and Series

**How do I know when to use each formula?**



Mixed Sequences and Series Practice

1) Find 1st 3 terms:  2) Find  for 

3) Find the 3 arithmetic means: 5, \_\_\_, \_\_\_, \_\_\_, -3 4) Find the 17th term if 

Mixed Sequences and Series Practice - Continued

5) 97 is the \_\_\_?\_\_ th term of –3, 1, 5, 9, … 6) Find sum of  to 15 terms

7) Find the sum of geometric series  8) Find the sum of 

**Statistics 1 – Finding Regression Equation

 9) Jean invested $380 in stocks. Over the next 5 years, the value of her investment grew, as shown in the accompanying table. Write the regression equation for this set of data, rounding all values to *two decimal places*. Using this equation, find the value of her stock, to the *nearest dollar*, 10 years after her initial purchase.

Statistics 2 – Fundamental Counting Rule, Permutations, Combinations

10) In the next Olympics, the United States can enter four athletes in the diving competition. How many different teams of four divers can be selected from a group of nine divers?

11) Find the total number of different twelve-letter arrangements that can be formed using the letters in the word PENNSYLVANIA.

12) A four-digit serial number is to be created from the digits 0 through 9. How many of these serial numbers can be created if 0 can not be the first digit, no digit may be repeated, and the last digit must be 5?

13) A multiple choice test has 10 questions where each question has 4answers. If you select one of the four answers for each question, how many different ways can you answer the questions?

Statistics 3 – Normal Distribution and Z-Scores

14) The width of shark jaws are normally distributed with a mean of 15.7 and a standard deviation of 2.8 inches. What is the probability that a shark that you examine at random has a jaw width less than 18.5 inches?

15) What is the probability that a shark that you examine at random has a jaw greater than 20 inches?

Variation

**Direct:  Inverse:  Joint: **

16) In building a brick wall, the amount of time it takes to complete the wall varies directly with the number of bricks in the wall and varies inversely with the number of bricklayers that are working together.  A wall containing 1200 bricks, using 3 bricklayers, takes 18 hours to build. How long would it take to build a wall of 4500 bricks if 5 bricklayers worked on it?

17) A ball is dropped from a window of a building.  The distance it falls varies directly with the square of the time it falls.  If a ball can fall 8 feet in 0.5 seconds, how far will it fall if it takes 2.5 seconds for it to hit the ground?

Composition of Functions

18) If  and , then find .

19) If and  , find .

Inverses

20) Find the inverse of . 21) Is  a one-to-one function?



22) Graph the inverse of the line segment.

23) What is the range of the graphed line segment?

24) What is the domain of the inverse?



25) Graph  and the inverse of .

Properties: Name the property

22) x + 9 = 9 + x  23) 2(x + 3) = 2x + 6  24) x + (y+3) = x +(3+y )

25) (5y) • (1) = 5y 26) (x y)z = x(y z ) 27) (y+2) + (-y +-2)= 0 28) 

EXTRA NOTES AND EXAMPLES:

**Arithmetic/Geometric Sequences/Series**

Ex) 

**Inverses** Switch x and y and re-solve for y!

Ex) y= 5x + 8

Inverse: x = 5y + 8

 x – 8 = 5y

 

Functional Inverse graphs: Reflected over the line *y* = *x* ---- *x* and *y* coordinates are switched---Domain/Range are switched

Popular inverse graphs created from other functions:

 Lines🡪Lines, Quadratics🡪Square Roots, , Cubes🡪Cube Roots, Exponential🡪Logarithms

Special notes about Exponentials/Logs:

Exponential graphs have horizontal asymptotes---Log graphs have vertical asymptotes

The equation of the inverse of an exponential is written using ‘log’:

Ex) The inverse of is written as 

**Composition of Functions:** ‘Compose’ one equation inside the other:

Ex) : Given the following functions, what is the composite function ?

  Answer: 

Remember, there is an *‘inside’* function and an *‘outside’* function. In this case, the *f (x)* is the inside function. Take the *f(x)* function and plug into the *x* in the *g(x)* function

**Variation**

Direct Variation

* Equation: y = kx (k is the constant of variation);
* graph is a line thru the origin
* Solve base equation for *k* and substitute it and remaining numbers into eqn. again)

Ex) If y varies directly as x and y is 6 when x is 18, find y when x is 24.

1) Set up to solve for k: 

2) Then plug k into the formula and find the missing variable:



Inverse Variation

* Example – the speed of a car and the time it takes to reach the destination
* Equation:  (is the constant variation)
* graph is a hyperbola in opposite quadrants (Quad I & III or Quad II and IV)
* To solve find *k* and substitute it and remaining numbers into eqn. again.

Ex) If y varies inversely as x and y = 10 when x = 2, find y when x = 6.

If  Find y now 

Joint

* A combination of direct and inverse variation in more complicated relationships
* varies jointly means directly with other relationships

|  |  |
| --- | --- |
| Examples of Joint Variation | Equation Form |
| y varies directly with the square of x. | y = kx2 |
| y varies inversely with the cube of x. | y =  |
| z varies jointly with x and y. | z = kxy |
| z varies jointly with x and y and inversely with w. | z =  |

**Statistics:**

* Given data
* enter the set of data into a list (or lists) on your graphing calculator.
* Look at the scatterplot graph, decide which model is most reasonable (linear, quadratic, cubic, logarithmic (LN), or exponential)
* calculate the appropriate regression formula. STAT🡪Calc Write the equation of this particular equation and use it to predict appropriate values not already included in the data.

Ex) {(1, 2.1), (3, 3.1), (5, 4.0), (7, 5.2), (9, 5.9)}

* Plug x into List 1 and y into List 2
* Graph the scatterplot.
* It should represent the line 

Using the equation for the line of best fit, predict the *y* value when *x* = 6:

Plug 6 in for x.

 

**Normal Distribution:**

A normal distribution shows data in a **symmetrical, bell-shaped curve.** Data is centered around the **mean ().** The ***standard deviation ()*** *tells how each data value in the set differs (deviates) from the mean*. Know from memory that the **Empirical Rule** tells us the probability distribution of the standard normal curve.

68% of the data fall within one standard deviation of the mean.

95% of the data fall within two standard deviations of the mean.

99.7 % of the data fall within three standard deviations of the mean.

**Z-Score**

A “***z-score***” represents the **number of standard deviations away from the mea**n

* A z-score with a negative value lies below the mean.
* A z-score of 0 lies at the mean
* A z-score with a positive value lies above the mean.

Z-scores are a way to compare different normal distributions,

To calculate the value of a z-score,  where is the mean and  is the standard deviation. “x” is the number you are seeking.

**Reading/Applying the Z-Score Table:**

Suppose I want to find out .

* Find the z-score of the data point (use the formula) if it is not given to you.
* Sketch and shade a graph of what data you are looking
* Go to the positive z-table since 1.28 is positive.
* Find 1.2 in the left row and
* Read across until you are under the .08 column
* What value did you find? 0.8897
* This is the probability that z < 1.28.

PRACTICE O:



 

PRACTICE P:

 

PRACTICE Q:





