Advanced Functions – Review for Final: Packet # 6 (Day Before Final Exam) Name: Key

1.) How many terms were added together for a geometric series whose first term is 4, common ratio is 3, and sum is 1,062,880?

$1062880 = \frac{4(1-3^n)}{(1-3)}$

$-2125760 = 4(1-3^n)$

$-531440 = 1-3^n$

$-531441 = -3^n$

$531441 = 3^n$

$\frac{\log 531441}{\log 3} = \frac{n \log 3}{\log 3}$

$n = 12$

→ 12 terms

2.) What is the sum of an arithmetic series whose eleventh term is 75, seventeenth term is 117, and last term is 236?

① $75 = a_1 + 10d$ ② $117 = a_1 + 16d$

$-42 = -6d$

$d = 7$

$75 = a_1 + 10(7)$

$a_1 = 5$

③ $236 = 5 + 7(n-1)$

$231 = 7n - 7$

$n = 34$

④ $S_{34} = \frac{34}{2}(5 + 236)$

$= 4097$

3.) Hank is trying to create a password for his phone. The password can be 5 characters. The first two characters must be letters, the middle character must be a number, and the last two characters must be a vowel. The characters of the password cannot repeat. How many different passwords can Hank make?

$\frac{26}{\text{letters}} \times \frac{25}{\text{letters}} \times \frac{10}{\#\ 0\text{–}9} \times \frac{3}{\text{vowel}} \times \frac{2}{\text{vowel}}$

← no repeats →

= 39,000 possible passwords

4.) Cammie has a bag of marbles containing 4 red, 3 yellow, 2 green, and 5 blue. She selects 2 marbles at random. Which scenario has a greater chance of happening? 14 marbles total

a.) Selecting a yellow and then a blue, no replacement.

$\frac{3}{14} \cdot \frac{5}{13} = \frac{15}{182} =$ 8.2%

b.) Selecting two yellows or two blues.

$\frac{{}_3C_2}{{}_{14}C_2} + \frac{{}_5C_2}{{}_{14}C_2} = \frac{3+10}{91} = \frac{13}{91} =$ 14.3%

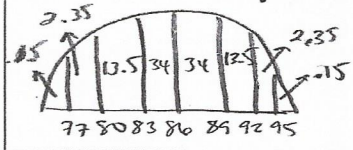
5.) A class has test scores: 76, 52, 82, 95, 76, 92, 99, 85, 89, 64, 78, 82, 76, 95. What are the measures of central tendency?

mean = 81.5 (average)

median = 82 (middle)

mode = 76 (most often)

6.) A class has exam scores that are normally distributed with a mean of 86 and a standard deviation of 3. Twenty-three of the students scored between 83 and 95. How many students took the exam?



$34 + 34 + 13.5 + 2.35 = 83.85\%$

$.8385x = 23$

$x = 27.4$ → about 27 students

7.) Nora wants to invest $1400 into an account that has a 4.3% interest rate and the account is compounded continuously. How long will it take for the account to be $3850?

$3850 = 1400e^{.043t}$

$2.75 = e^{.043t}$

$\frac{\ln 2.75}{.043} = \frac{.043t}{.043}$

$t = 23.5$ yrs

8.) Given the piecewise function:

$$f(x) = \begin{cases} 2x+4 & \text{if } x \le -2 \\ 3-x^2 & \text{if } x > -2 \end{cases}, \text{ find } f(6) + 2f(-4).$$

$f(6) = 3 - (6)^2 = -33$

$f(-4) = 2(-4) + 4 = -4$

$\Rightarrow -33 + 2(-4)$

$= -41$

9.) The table below shows the outstanding household credit market debt (in trillions of dollars) from 1998 through 2004. A linear model best models this data. What will be the debt in the year 2018?

Year	Household credit market debt, D (in trillions of dollars)
1998	6.0
1999	6.4
2000	7.0
2001	7.6
2002	8.4
2003	9.2
2004	10.3

$y = .710714x - 1414.2964$

$x = 2018$

$y = ?$ →

$19.9 trillion

10.) The table shows the numbers N of commercials banks in the U.S. from 1996 to 2005, where x = 6 for 1996. A logarithmic model best models this data. In what year will the number of banks drop to 5,300?

Year	Number, N
1996	9527
1997	9143
1998	8774
1999	8580
2000	8315
2001	8079
2002	7888
2003	7770
2004	7630
2005	7540

$y = 13387.29022 - 2190.5231 \ln x$

$x = ?$

$y = 5300$ →

$x = 40$ so 2030