Key

Name: _____ Date: _____

Arithmetic / Interest Final Exam Review

1) What are the following in terms of arithmetic sequences / series:

n= number of terms t_n = value of the 'n^{th}' term

t_1 = first term d= common difference

S_n = sum of n terms

2) For the following arithmetic sequence, find the 47th term: *64, 61, 58, ...*

$t_1 = 64$, $d = -3$, $n = 47$

$t_n = t_1 + (n-1)d$

$t_{47} = 64 + (47-1)(-3)$

$= 64 + 46(-3)$

$= -74$

3) Find the first term of an arithmetic sequence with $t_{10} = 67$ and $d = 7$.

$n = 10$, $t_{10} = 67$, $d = 7$

$t_n = t_1 + (n-1)d$

$67 = t_1 + (10-1)(7)$

$67 = t_1 + 63$

$t_1 = 4$

4) If the first term of an arithmetic sequence is -42, and the last term is 54, with a common difference of 6, find the number of terms.

$t_1 = -42$, $t_n = 54$, $d = 6$

$t_n = t_1 + (n-1)d$

$54 = -42 + (n-1)6$

$54 = -42 + 6n - 6$

$54 = 6n - 48$

$6n = 102$

$n = 17$

5) Janie starts with 34 pins and adds 13 pins each month to her collection. How many pins will she have in 4 years? **Think carefully about what your 'n' value will be.*

34, 47, 60, ...

$n = 49$, $t_1 = 34$, $d = 13$

$t_n = t_1 + (n-1)d$

$t_5 = 34 + (49-1)(13)$

$t_5 = 34 + 624$

$t_5 = 658$

6) Ben is 12 and has a birthday party. Every 7 years after that, up to and including his 103rd birthday, he has another party. How many parties has Ben had in total?

$12, 19, 26, \ldots, 103$

$t_1 = 12 \quad d = 7$

$t_n = 103$

$t_n = t_1 + (n-1)d$

$103 = 12 + (n-1)(7)$

$91 = 7(n-1)$

$n-1 = 13$

$n = 14$

14 parties

7) Find the sum of the arithmetic series: $57 + 50 + 43 + 36 + \ldots + -34$

$t_1 = 57$

$d = -7$

$t_n = -34$

$t_n = t_1 + (n-1)d$

$-34 = 57 + (n-1)(-7)$

$-91 = -7(n-1)$

$n-1 = 13$

$n = 14$

$S_n = \frac{n(t_1 + t_n)}{2}$

$S_{14} = \frac{14(57 + -34)}{2}$

$S_{14} = 161$

8) Find the sum of an arithmetic series that starts at -8, has a common difference of -9, and has 21 terms.

$t_1 = -8$

$d = -9$

$n = 21$

$S_n = \frac{n}{2}(2t_1 + (n-1)d)$

$S_{21} = \frac{21}{2}(2(-8) + (21-1)(-9))$

$S_{21} = 10.5(-16 + -180)$

$S_{21} = 10.5(-196)$

$S_{21} = -2058$

9) If an arithmetic series has $S_{10} = 635$, and $t_{10} = 113$, find t_1.

$S_n = \frac{n(t_1 + t_n)}{2}$

$635 = \frac{10(t_1 + 113)}{2}$

$635 = 5(t_1 + 113)$

$t_1 + 113 = 127$

$t_1 = 14$

10) If an arithmetic series has a first term of 17, and $S_9 = 729$, find d.

$t_1 = 17$

$n = 9$

$S_9 = 729$

$S_n = \frac{n}{2}(2t_1 + (n-1)d)$

$729 = \frac{9}{2}(2(17) + (9-1)d)$

$729 = 4.5(34 + 8d)$

$162 = 8d + 34$

$128 = 8d$

$d = 16$

11) Find $\sum_{n=2}^{7} 3n + 2$

$(3(2)+2) + (3(3)+2) + (3(4)+2) + (3(5)+2) + (3(6)+2) + (3(7)+2)$

$8 + 11 + 14 + 17 + 20 + 23$

$S_n = \frac{n(t_1 + t_n)}{2}$

$S_6 = \frac{6(8 + 23)}{2}$

$S_6 = \frac{6(31)}{2}$

$S_6 = 93$

12) If you started with \$11 and then were given \$14 after the first minute, then \$17 after the next minute, and this pattern continued, how much would you have after 25 minutes?

$11 + 14 + 17 + \ldots$

$n = 26$, $t_1 = 11$, $d = 3$

$S_n = \frac{n}{2}\left[2t_1 + (n-1)d\right]$

$S_{26} = \frac{26}{2}\left[2(11) + (26-1)(3)\right]$

$S_{26} = 13(22+75)$

$S_{26} = \$1261$

\$1261

13) Calculate the simple interest when \$7500 is invested at 4.8% for 6 years.

$I = Prt$

$I = (7500)(0.048)(6)$

\$2160

14) Calculate the number of years (to the nearest tenth) that \$2800 is invested at 5% in order to make \$750 in simple interest.

$I = Prt$

$750 = 2800(0.05)t$

$750 = 140t$

$t = \frac{750}{140} = 5.4$

5.4 years

15) \$4800 is invested at 3.9% for 4 years simple interest. After 4 years, all of that money is taken and invested at 5.1% for 5 years simple interest. How much in total will you have after this?

$I = Prt$

$I = 4800(0.039)(4)$

$I = 748.80$

$4800 + 748.80 = 5548.80$

$I = 5548.80(0.051)(5)$

$I = 1414.94$

$Total = 5548.80 + 1414.94$

\$6963.74

16) \$35 000 is invested for 6 years at compound interest of 6.7%. How much total money will you have after 6 years?

$A = P(1+r)^t$

$A = 35000(1+.067)^6$

$A = 35000(1.067)^6$

$A = 51\,648.13$

\$51648.13

17) Buddy ends up with $28 600 after 6 years of compound interest at 4%. How much did he originally invest?

$A = P(1+r)^t$

$28600 = P(1.04)^6$

$P = \frac{28600}{(1.04)^6} = 22\,603.00$

$22 603

18a) Cara wins $3 000 000 in a lottery. She decides to invest it at 5.7% compound interest for 7 years. How much will she have in total at that point?

$A = P(1+r)^t$

$A = 3\,000\,000(1.057)^7$

$4 422 279.28

b) How much more interest will she make with compound interest compared to if she invested with the same terms at simple interest?

$I = Prt$

$I = 3000000(0.057)(7)$

$I = 1197000$

$Total = 3000000 + 1197000$

$4 197000