PROBLEMS ON SEQUENCES

I.4 The sum of all even integers between 10 and 100 inclusive is
(a) 2500 (b) 2510 (c) 2520 (d) 2530 (e) 2540

I.19 Ed starts with no money and receives successive payments of \$1, \$2, \$4, \$8, ... Donna starts with \$22 and receives \$15 each time Ed receives a payment. After how many payments will Ed have at least as much as Donna?
(a) never (b) 10 (c) 6 (d) 7 (e) 8

I.22 Suppose $a_1, a_2, \ldots$ and $b_1, b_2, \ldots$ are arithmetic progressions with $a_1 - b_1 = 3$ and $a_3 - b_3 = 5$. What is $(a_1 + a_2 + \ldots + a_7) - (b_1 + b_2 + \ldots + b_7)$?
(a) 17 (b) 42 (c) 21 (d) 35 (e) 50

I.40 A quantity grows geometrically so that it takes 8 years for the initial amount to quadruple. How many years does it take for the amount to be $8(2)^{1/2}$ times the initial amount
(a) 12 (b) 14 (c) $16(2)^{1/2}$ (d) 20 (e) 24

II.7 The sum of an arithmetic progression is 1275. If the first term is 3 and the last term is 99, then the difference between successive terms is
(a) 2 (b) 3 (c) 4 (d) 5 (e) 6 .

II.27 What is the value of the infinite series $\sum_{n=1}^{\infty} 1/n(n+2)$? (a) 1 (b) 1/2 (c) infinity (d) $\pi/6$ (e) 3/4

II.32 What is the value of the infinite product $\prod_{n=1}^{\infty}(1 + 1/n(n-2))$?
(a) 2 (b) infinity (c) 0 (d) 1 (e) 4

III.4 If the fourth term of a geometric progression is a and the sixth term is b, then the first term is
(a) a^4/b^6 (b) b^4/a^6 (c) $a^{5/2}/b^{3/2}$ (d) $a^{3/2}/b^{5/2}$ (e) $6a - 4b$

IV.2 If the sum and difference of the first two terms of a geometric progression are respectively 18 and 12, then the third term of the progression is
(a) 24 (b) 36 (c) 45 (d) 64 (e) 75

IV.3 Let A(n) be the statement $n^2 < 49$ and B(n) the statement $2n^2 + n - 3 < 0$. Then the sum of all positive integers for which A(n) is true and B(n) is false is
(a) 15 (b) 6 (c) 10 (d) 1 (e) 20

IV.31 For N a positive integer let $S_N = 2 + 4 + 6 + \ldots + 2N$. For how many integers is S_N a perfect square?
(a) 1 (b) 0 (c) 2 (d) more than two but a finite number (e) infinitely many

V.4 If the sum of the first four terms of an arithmetic progression is 32, and the sum of the first six terms is 60, then the first term is
(a) 3 (b) 5 (c) -17/3 (d) 19/2 (e) -10

V.29 The value of the sum $\sum_{n=1}^{100} 1/n(n+1)$ is
(a) 17/4 (b) 23/17 (c) 1325/97 (d) 100/101 (e) 199/99

VII.12 Given that the second term of a geometric progression is 1/3 and the fourth term is 4/27 then the third term is
(a) 2/3 (b) 4/9 (c) 8/27 (d) 4/81 (e) 2/9

VII.20 A sequence of n integers is such that the sum of any two successive integers is positive and the sum of any three successive integers is negative. The maximum value for n is (a) 2 (b) 3 (c) 4 (d) 6 (e) larger than 6.

VIII.3 If S is the sum of all integers between 10 and 200 which are divisible by 7 then S =
(a) 2513 (b) 2772 (c) 2835 (d) 2905 (e) 2947.

VIII.6 The third and seventh terms of a geometric progression are respectively 3 and 48. The first term is then
(a) 1/3 (b) 12 (c) 1 (d) 3/4 (e) 1/16

IX.12 Given that the sum of the first and third terms of a geometric progression is 2, and the second term is 1 less than the first term, then the sum of all possible values for the first term is
(a) 0 (b) 2 (c) $5^{1/2}$ (d) $2 + 6^{1/2}$ (e) $3^{1/2} - 1$

X.17 Given an arithmetic progresion, if the sum of the first ten terms is 205 and the fourth term is 16 then the first term is (a) 4 (b) 5 (c) 6 (d) 7 (e) 8 .