PROBLEMS ON MAGNITUDES

I.7 Of the following which is closest to 2^{40} ?

(a) 10^4 (b) 10^8 (c) 10^{12} (d) 10^{16} (e) 10^{20}

I.30 If $x > 1{,}000{,}000$ which of the following numbers is the largest?

(a) x^{10} (b) $10{,}000{,}000x$ (c) 2^x (d) $\log_{10}x$

(e) $40x + 80x^2 + 120x^3$

II.19 Of the following numbers which is the largest?

(a) $3^{(4^5)}$ (b) $4^{(3^5)}$ (c) $5^{(4^3)}$ (d) $5^{(3^4)}$ (e) $4^{(5^3)}$

V.17 If $n > 1{,}000$ then which number is the larger?

(a) n^{100} (b) 2^n (c) $\log_2 n$ (d) $n^{30} + n^{40} + n^{50}$ (e) $n^{1/n}$

VI.15 Given the five numbers $(2^4)^8$, $8^{(2^4)}$, $(8^4)^2$, $4^{(8)^2}$, and $8^{(4^2)}$ the ratio of the largest to the smallest is

(a) 4^{52} (b) 2^{81} (c) 8^{39} (d) 16^{23} (e) 2^{1020} .

VI.28 The number 20! (= 1x2x3x...x20) is best approximated by which of the following?

(a) $3\text{x}10^{10}$ (b) $5\text{x}10^{14}$ (c) $2\text{x}10^{18}$ (d) $4\text{x}10^{22}$ (e) $6\text{x}10^{26}$

II.5 If $y = 10^8 + 1$ and $x = 10^3 - 1$ then $1/(1/x - 1/y)$ is near (a) 10^{-5} (b) 10^{11} (c) 10^3 (d) $10^{3/8}$ (e) 10^5

III.4 The largest integer N such that N! < 1,000,000 (where N! = 1x2x3x...xN) is

(a) 7 (b) 9 (c) 10 (d) 11 (e) 15

X.23 The ratio $3^{100}/10^x$ is a number between 1 and 10 if x =

(a) 17 (b) 29 (c) 47 (d) 59 (e) 78

X.14 Given a sequence of ten numbers, if the first number is 2 and each other number is the square of the preceding number then the tenth number is between which pair of numbers:

(a) 10 and 10^5 (b) 10^5 and 10^{10} (c) 10^{10} and 10^{50}

(d) 10^{50} and 10^{100} or (e) more than 10^{100} ?

X.30 If $y = x - (x^2 - 1)^{1/2}$, $x \geq 1$ then (a) the smallest value of y is negative (b) the largest value of y is greater than 1 (c) y does not have a largest value (d) y does not have a smallest value (e) none of (a)-(d).