Ciphering

1. How many 3-digit numbers can be written using no 0's and at least one 7?

   Correct Answer: 217

2. Let $f(x) = \frac{x^3}{x^2+1}$. Find the value of x if $f^{-1}(x) = 2$.

   Correct Answer: $\frac{8}{5}$

3. The odds in favor of winning a baseball game are 4:6. What is the probability of losing the game?

   Correct Answer: $\frac{6}{4+6} = \frac{6}{10} = 0.6$

4. If it costs a farmer \$2.80 to produce a bushel of peanuts which sells for \$5.00, how much profit does the farmer make on 250 bushels of peanuts?

   Correct Answer: \$550.00

5. Find the exact value of the determinant $\begin{vmatrix} 3 & 2 & 1 \\ \cos 30^\circ & \sin 30^\circ & 0 \\ \sin 30^\circ & -\cos 30^\circ & 0 \end{vmatrix}$

   Correct Answer: -1

6. The consecutive angles of a trapezoid form an arithmetic sequence. If the smallest angle is $75°$, then what is the largest angle?

   Correct Answer: 105°

7. $\sum_{n=0}^{\infty} (-1)^{n+2} \frac{2^{n-2}}{3^n} = ?$

Correct Answer: $\frac{3}{20}$

8. Two parents and their four children are to be seated in a row of chairs for a family photo. In how many different ways can the family members be arranged if a parent must sit in the chair at one end of the row and the remaining parent must sit at the other end?

Correct Answer: 2(4!) = 48 ways

9. Solve: $\ln(1-x) + \ln(3-x) = \ln 8$ in the real number system.

Correct Answer: $x = -1$

10. Who finally proved Fermat's Last Theorem in 1994?

Hint: The first letter of my last Name is "W".

Correct Answer: Andrew Wiles

11. Find the exact value of $\csc\left(\tan^{-1}\frac{1}{2}\right)$.

Correct Answer: $\sqrt{5}$

12. Fifty percent more than what number is 25 percent less than 60 percent more than 10?

Correct Answer: 8

13. If $\frac{1}{2}\cos^2 x + y = \frac{1}{4}\cos 2x$, what is the value of y?

Correct Answer: $y = -\frac{1}{4}$

14. In a survey of 1200 automobile drivers, 250 said they wash their car weekly, 200 said they wash their car once every two weeks, 350 said they wash their car once a month, and 400 said they never wash their car. If the data were to be represented by a Pie-Chart (circle graph), what angle in degrees should be used for the sector of the graph that represents those drivers who wash their cars once a month?

Correct Answer: $\frac{350}{1200} \cdot 360^\circ = 105^\circ$

15. Find the difference between the sum of all even integers 0 through 1000 and the sum of all odd integers 0 through 1000.

Correct Answer: 500

16. $\lim_{x \to 1} \frac{x-1}{\sqrt{x}-1} = ?$

Correct Answer: 2

17. The sum of the coordinates of the center of the conic given by $x^2 + y^2 - 12x - 10y - 1 = 0$ is ?

Correct Answer: 11

18. Simplify the following and write as a single rational expression in lowest terms:

$$1 + \cfrac{1}{2 + \cfrac{1}{3 + \frac{1}{4}}} = ?$$

Correct Answer: $\frac{43}{30}$

19. Find the "median" of the following set of data:
{ 40, 91, 80, 69, 78, 91, 85, 77, 70, 82}

Correct Answer: 79

20. Who I am?

Hint: I am a character in the TV Show "NUMB3RS".

Correct Answer: Charlie Eppes (Or David Krumholtz, the name of the actor)