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art I: - Write true if the statement is correct or false if it is incorrect (1 pt each)

____1. The real part of any complex number z and its conjugate are the same.

____2. Every integer power of a complex number i is a member of the set $\{-i, -1, i, 1\}$.

____3. The subset of a Cartesian product of any two nonempty set is a function.

____4. The inverse of any one to one correspondence function is also function.

____5. The Exponential function has horizontal asymptote but not vertical.

____6. The function $f: \mathbb{N} \to \mathbb{N}$ given by $f(x) = 3x$ is onto function.

____7. $10^{2n-1} + 1$ is divisible by 11 for all $n \in \mathbb{N}$.

____8. Logarithmic function has y−intercept but not x− intercept.

____9. Trigonometric functions are periodic functions with period $p = 2\pi$.

____10. The value of x which satisfies $\log x + \log(x + 3) = 1$ is 2.

Parts II: - Fill the simplified answer in the given space for the following questions (1 pts eac

1. The range of the function $f(x) = \frac{x}{|x|}$ is _____
2. The radian measure of 25^0 is _____
3. If $f(x) = x^3 - \frac{1}{x^3}$,then $f(x) + f\left(\frac{1}{x}\right)$ is equal to _____
4. Let $f(x) = x + 1$ and $g(x) = \sqrt{x-1}$,then $(fog)(5)$ is equal to _____
5. The modulus of $z = \frac{1-i}{3+i} + \frac{4i}{5}$ is _____
6. the principal argument of the complex number $z = -2 + 2\sqrt{3}i$ is _____
7. The amplitude of a function $f(x) = \cos(\frac{x}{4})$ is _____
8. The polar form of the complex number $z = (2 + 2i)^{1000}$ is _____
9. If $f(x) = x - 3$ and $g(x) = x^2 + 3$,then $(gf)(x) =$ _____
10. If $f(x) = \frac{x^3-1}{(x^2-1)(x^4-16)}$ then the vertical asymptote(s) of f is(are) _____

Parts III:-Write the simplified answer from the given alternative in a given space (1.5 pts

_____1. Which one of the following is differ from the other?

A. $y = 2x$

B. $y = 1$

C. $x = 2$

D. $y = x^2 + 3$

_____2. Let $f: \mathbb{R} \to \mathbb{R}$ defined by $f(x) = \begin{cases} x+2, if\ x < -1 \\ x^2, if\ -1 \leq x \leq 1 \\ 2-x, if\ x > 1 \end{cases}$, then the value of $f(-1.75) + f(0.5) + f(1.5)$ is

A. 0

B. 1

C. 2

D. 3

_____3. Which one of the following is a real valued function

A. $f(x) = \frac{2-x}{x-4}$

B. $f(x) = \sin x$

C. $f(x) = x^4 + 3x^3 + 2x^2 + x - 4$

D. all

_____4. The value of x which satisfies the equation $\log_6(x+2) - \log_6 x = 2$ is

A. $\frac{2}{35}$

B. $\frac{35}{2}$

C. -6

D. $\frac{1}{18}$

_____5. Suppose $f(x) = \log(x-3)$ and $g(x) = x + 4$, then the domain of $(fog)(x)$ is

A. $(-3, \infty)$

B. $(-\infty, -3)$

C. $(-1, \infty)$

D. $[-1, \infty)$

_____6. All the zeros of the polynomial $p(x) = 2x^3 - 9x^2 - 6x + 40$ are

A. $-2, \frac{5}{2}, 4$

B. $0,\ 2,\ \frac{5}{2}$

C. $2, \frac{5}{2}, -4$

D. $2, -9, -6$

_____7. Which one of the following functions has an inverse function?

A. $f(x) = |x-4|$

B. $g(x) = (x+4)^3$

C. $h(x) = (x+4)^4$

D. $h(x) = \frac{1}{(x-4)(x+4)}$

_____8. Let $f(x) = \frac{1}{x+3}$, then which one of the following is a formula for $f^{-1}(x)$

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A. $f^{-1}(x) = \frac{1}{x+3}$

B. $f^{-1}(x) = \frac{1}{x} - 3$

C. $f^{-1}(x) = 3 - \frac{1}{x}$

D. $f^{-1}(x) = x + 3$

_____9. Suppose that when the polynomial $p(x)$ is divided by $x - 5$,the quotient is $3x^4 - 5x^2 + 2x - 5$ with a remainder 4 .then we may conclude that

A. $x - 4$ is a factor of p and 4 is the zero of p

B. $x + 5$ is not a factor of p and -5 is not a zero of p

C. $x - 5$ is a factor of p and 5 is a zero of p

D. $x - 5$ is not a factor of p and 5 is not a zero of p

_____10. Let $f(x) = x^3 + 5x + 1$,then which one of the following is true for any real number x

A. f is onto but not one to one

B. f is one to one correspondence

C. f is neither one to one nor onto

D. f is one to one but not onto

Parts IV

NB: Workout only five questions from the given alternative by writing the steps clearly and neatly (3 pts. each)

A. Find the cube roots of the complex number $z = -8i$

B. Find the inverse of sine hyperbolic function

C. Find all the zeros of the function $p(x) = x^4 + 2x^3 - 9x^2 + 26x - 20$

D. Sketch the graph of the function $R(x) = \frac{x^2+3x+2}{x^2-1}$

E. Sketch the graph of the function $f(x) = \tan x$

F. Sketch the graph of the function $f(x) = \log(x + 3)$

G. Sketch the set of points determined by the condition $|z + i| \leq 3$

H. Show that the equation $|z - z_0| = r$ which is a circle of radius r and centered at z_0 can be written $|z|^2 - 2Re(z\overline{z_0}) + |z_0|^2 = |r|^2$

I. Find the equation of the straight line passing through the point (2,3) and perpendicular to the line $4x - 4y = 10$ and $3x + 4y = 18$

J. If $3x - by + 2 = 0$ and $9x + 3y + a = 0$ represents the same straight line, then find the values of a and b