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WACHEMO UNIVERSTIY

MATHS FINAL EXAM

Part I. Short Answer Questions (10pts)

Direction: For each of the following questions write your short and simplified answers only the space provided.(2pts each)

1. Let $f(x) = x + 4$ and $g(x) = x^2 - 4$. Then the domain of $\left(\frac{f}{g}\right)(x) =$ _____
2. If $f(x) = \sqrt{x^3}$ and $(fog)(x) = \sqrt[4]{x}$, then $g(64) =$ _____.
3. If $f(x) = \frac{ax+b}{2}$ and $f^{-1}(x-1) = \frac{2x-5}{2}$, then the value of a & b respectively = _____
4. The simplified form of $\sin\left(\frac{\pi}{2} - x\right)\tan x =$ _____.
5. Suppose $f(x) = \frac{2x^2-ax+4}{x-2}$ be a rational function. If the line $y = 2x - 3$ is its oblique asymptote, then the value of $a =$ _____.

Part II. Workout Questions (40pts)

Direction: Attempt all questions by showing all the necessary steps neatly and clearly on the answer sheet provided. (5pts each)

1. Find the cube root of $z = 1 + i^5$.
2. When $2x^3 - 5x^2 + 4x - 8$ is divided by $ax^2 + bx + c$ the quotient is $x - 2$ and the remainder is $bx - a$. Then find the values of a, b and c.
3. Solve for x if $x = 12^{\log_6 8x}$.
4. Sketch the graph of $f(x) = 1 + \log_2(3 - x)$ and identify the domain, range, intercepts and asymptotes.
5. Find the inverse of $y = \cosh x$.
6. If the line $3x - 2y - m = 0$ divides the line segment joining $P(-1, -3)$ and $Q(4,5)$ internaly in the ratio $PR: RQ = 2:3$ at R. Find the value of m.
7. Consider a circle whose center is on the y-axis. If a line given by $y = -2x$ is tangent to the circle at $(\frac{-1}{2}, 1)$. Find the equation of the circle.
8. Show that the directrix of the parabola $y^2 = 4px$ is tangent to the circle whose diameter is the latus rectum of the parabola. Also find the length of the chord of the circle along the y-axis.

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