UP SCHOOL OF STATISTICS STUDENT COUNCIL

EDUCATION & RESEARCH

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M17_LE3_001

Mathematics 17 — College Algebra and Trigonometry

Third Long Examination — First Semester, AY 2012-2013

I. Write TRUE if the statement is true. Otherwise, write FALSE. *1 point each*

1. If $9^x = 5$, then $81^x = 45$.
2. If $-2i$ is a root of the polynomial function $p(x)$ with real coefficients, then $x - 2i$ is a factor of p.
3. All functions are not symmetric with respect to the x-axis.
4. For all real numbers a, $0 < a < 1$, $\log_a 4 > \log_a 3$.
5. $f(x) = \dfrac{2x^3}{1-x^4}$ is an odd function.

II. Do as indicated. Show your complete solution. *2 points each*

1. Find the solution set of the equation $2^{3x+1} = {\frac{1}{2}}^{x^2+1}$.
2. Find the value of k such that $x + 3$ is a factor of $x^3 + kx^2 + 11x + 33$.
3. Find the value of h such that $3h - 5$, $3h + 1$, $h/2$ are the first second and third terms of a geometric sequence, respectively.
4. Evaluate: $\log_x x^2 - \log_2 4$.
5. Find the polynomial $p(x)$ of lowest degree such that $-i$ is a simple root, 1 is another simple root and -1 is a root of multiplicity 3.

III. Do as indicated. Show your complete solution. *4 points each*

1. Given $f(x) = \dfrac{3x+4}{x-8}$, find dom f, ran f and f^{-1}.
2. Given $f(x) = \dfrac{x^2}{x^2-9}$ and $g(x) = \sqrt{25-x^2}$, find $f \circ g$ and its domain.
3. Solve for all $x \in \mathbb{C}$ such that $2x^4 + 3x^3 + 4x^2 + 12x + 9 = 0$.
4. Solve for x in the equation $3 + \log_2(2x - 1) = \log_4 9 - \log_2(x - 1)$.
5. Detective Ruzaki is well known for catching high-profile criminals with ease. Year after year, the number of criminals caught follows an arithmetic progression. In his first ten years of work, he caught a total of 240 criminals. Given that at his fifth year as a detective, he caught 22 criminals, how many more criminals did he catch each year?

IV. Given

$$f(x) = \begin{cases} x^2 + 4x + 4 & , x \le -1 \\ 2 - |x| & , -1 < x < 1 \\ \dfrac{2x - x^2}{2 - x} & , 1 \le x \le 3, x \ne 2 \\ -2 & , x = 2 \end{cases}$$

Sketch the graph of f. Give dom f and ran f. *5 points*

END OF EXAM