King Fahd University of Petroleum and Minerals

College of Sciences, Prep-Year Math Program

Code 002

MATH 001
Exam I (Term 011)
Time Allowed: **90 Minutes**
October 6, 2001

Code 002

NAME:_____ ID#:_____ SECTION#:_____

Important Instructions

No Calculator, Pager or Mobile Telephones are allowed in the Exam

This Exam consists of 2 Parts.

Part I: **Q. 1-5 are Multiple Choice Questions. Encircle the correct answer.**

Part II: **Q1-5 are written questions. Provide neat and complete solution of each question.**

Looking around or making an attempt of cheating may cause your expulsion from the Place of Exam.

Write your Name, ID number and Section # on the examination paper.

Part I (MCQ)	Part II	1 a	1 b	2 a	2 b	2 c	3 a	3 b	3 c	3 d	4 a	4 b	4 c	5 a	5 b	5 c	5 d

Total: /100

CODE 002

(1): If $A = \{x | x$ is a composite number not greater than $12\}$
$B = \{x |$ is an odd number and $0 \leq x < 25\}$
$C = \{x | x$ is a prime number less than $15\}$

1(a): List all elements of A, B and C. **(6 points)**

1(b): Find $(A \cap B) \cup C$. **(4 points)**

Solution:

1(a):

$A =$
$B =$
$C =$

1(b): $(A \cap B) \cup C =$

2(a): Write the complex number $Z = \dfrac{i^{19}}{-2+3i}$ in standard form. **(6 points)**

2(b): Let $Z_1 = x - 4i$, , $Z_2 = 5 - 2yi$. If $Z_2 = 3Z_1 - 5$, find the real numbers x and y. **(6 points)**

2(c): Write the interval $(-\infty, 3] \cap (2, \infty)$ in inequality notation. **(2 points)**

3(a): Write the following expression without absolute value symbols and in simplest form:

$$\left|\frac{-2x+2}{|x|+|x-2|}\right|, \text{ given } 0<x<1$$ **(6 points)**

3(b): Rationalize the denominator of $\frac{\sqrt{20}}{3+\sqrt{5}}$. Then write your answer in the form $A+B\sqrt{5}$ where A and B are **rational** numbers. **(6 points)**

3(c): Rewrite the expression $3x\sqrt[3]{8x^3y^4}+4y\sqrt[3]{64x^6y}$ in the simplest form. **(5 points)**

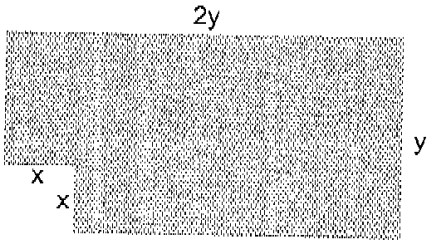
3(d): Evaluate $\sqrt[5]{0.00032}$ **(5 points)**

4(a): If $x > 0$ and $y > 0$, simplify the following: **(7 points)**

$$\left[\frac{(x^2y)^{-1}(5^3x^3y^{-2})^2}{5^2(xy)^{-3}(x^5y^{-2})^{-1}}\right]^{-\frac{1}{4}}$$

4(b): Find the sum of the numerical coefficients of all terms in the expression $(2x-3y)^3$. **(5 points)**

4(c): A square of side x *cm* is cut from a rectangular sheet of aluminium as shown below. Write the remaining area of the shaded portion of the following figure in terms of x and y. **(4 points)**



5(a): Show that $2x$ is a factor of $x^3 - 3x^2y + 3xy^2 - y^3 + (x+y)^3$. **(6 points)**

$(x-y)^3 + (x+y)^3 \quad x^3 + 3x^2y + 3xy^2 + y^3$ (2)

$2x^3 + 6xy^2$ ——— (2)

$2x(x^2 + 6y^2)$. ——— (2)

5(b): Factor the following polynomial completely: **(4 points)**

$15y - 3x - 10y^2 + 2xy$

$3(5y-x) - 2y(5y-x)$ — (2)

$= (5y-x)(3-2y)$ — (2)

5(c): Find the positive value of k for which the trinomial $36x^2 + kxy + 100y^2$ is a perfect square. **(4 points)**

$(6x)^2 + kxy + (10y)^2$ (1)

$= (6x + 10y)^2$ (1)

if $K = 2 \times 6 \times 10 = 120$ (

5(d): Simplify the following fraction **(6 points)**

$$\frac{3 + \frac{2}{1 - \frac{3}{x}}}{4 + \frac{1}{2 + \frac{1}{x}}}$$

$= \dfrac{3 + \frac{2}{\frac{x-3}{x}}}{4 + \frac{1}{\frac{2x+1}{x}}}$ (1) (1) $= \dfrac{3 + \frac{2x}{x-2}}{4 + \frac{x}{2x+1}}$ (1)

$= \dfrac{3x - 6 + 2x}{\frac{x-2}{9x+4+x}}$ (1) $= \dfrac{5x-6}{\frac{x-2}{9x+4}}$ (1)

$\frac{9x+4+x}{2x+1}$ $\qquad \frac{9x+4}{2x+1}$ $= \left(\frac{5x+6}{x-2}\right)\left(\frac{9x+4}{9x+4}\right)$

(1)

(1): The expression $\left(\frac{a^{-1}b - ab^{-1}}{a^2 - b^2}\right)^{-1}$ simplifies to **(3 points)**

(a) ab
(b) $-ab$
(c) $\frac{1}{ab}$
(d) $-\frac{1}{ab}$

(2): The expression $\frac{n^2+3n}{n} \div \frac{n+3}{n}$ simplifies to **(3 points)**

(a) n
(b) $\frac{n}{n+3}$
(c) $\frac{1}{n}$
(d) $\frac{-(n+3)}{n}$

(3): The expression $(\sqrt{-3}-4)(\sqrt{-3}+4)$ simplifies to **(3 points)**

(a) $16+\sqrt{3}$
(b) 19
(c) 13
(d) -19

(4): Which one of the following statements is **TRUE**? **(3 points)**

(a) The smallest odd composite number is 9.
(b) The set of irrational numbers is closed under addition.
(c) The sum of two composite number is a composite number.
(d) If a is real number, then $a^2 \geq a$.
(e) $(a+6)+2y = (6+a)+2y$ is true because of associative property.

(5): The decimal form of 5.62×10^{-4} is equal to: **(3 points)**

(a) 56200
(b) 0.0000562
(c) 0.000562
(d) 562000

(6): Which one of the following statements is **FALSE**? **(3 points)**

(a) The product of a complex number z and its conjugate $\bar{z}$ is a real number.
(b) If $m < 0$, then $|m| = -m$.
(c) 1 is the only positive integer that is not prime and not composite.
(d) $|-y| = y$ for any real number y.
(e) Every real number is either rational or irrational number.