Math 001.10 **Quiz # 1** **Sem. I , Sep 27 , 2006**

Name :_____ **ID. # :** _____ **SER. # :** ____

Complete the following, **show your work** and **simplify** your answer:

- The multiplicative inverse of -0.025 is $\cdots\cdots\cdots$

Ans : The multiplicative inverse of -0.025 is $\dfrac{1}{-0.025} = -\dfrac{1}{\frac{25}{1000}} = -\dfrac{1000}{25} = -40$

- The coefficient of x^3 in the product $(2x-3)^2(3x^2+5x-2)$ is $\cdots\cdots\cdots$

Ans : $(2x-3)^2(3x^2+5x-2) = (4x^2-12x+9)(3x^2+5x-2)$, so the coefficient of x^3 in this product
$= (4)(5) + (-12)(3) = 20 - 36 = -16$

- If $\mathrm{A} = \{x | x \text{ is an odd integer }, \ 2 \le x < 18\}$ and
$\mathrm{B} = \{x | x \text{ is a prime number } < 14\}$, then $\mathrm{A} \cap \mathrm{B} = \cdots\cdots\cdots$

Ans : $\mathrm{A} = \{3,5,7,9,11,13,15,17\}$, $\mathrm{B} = \{2,3,5,7,11,13\}$, and $\mathrm{A} \cap \mathrm{B} = \{3,5,7,11,13\}$

- When rationalized, the expression $\dfrac{\sqrt{12}-\sqrt{2}}{\sqrt{12}+\sqrt{2}} = \cdots\cdots\cdots$

Ans : $= \dfrac{2\sqrt{3}-\sqrt{2}}{2\sqrt{3}+\sqrt{2}} \cdot \dfrac{2\sqrt{3}-\sqrt{2}}{2\sqrt{3}-\sqrt{2}} = \dfrac{(2\sqrt{3}-\sqrt{2})^2}{12-2} = \dfrac{12-4\sqrt{6}+2}{10} = \dfrac{14-4\sqrt{6}}{10} = \dfrac{7-2\sqrt{6}}{5}$
$= \dfrac{1}{5}(7-2\sqrt{6})$

- If $-2 < x < -1$, then $\left|\dfrac{x+1}{|x|+|x+2|}\right| = \cdots\cdots\cdots$

Ans : $x < -1 \implies x+1 < 0 \implies |x+1| = -(x+1)$, $x < 0 \implies |x| = -x$ and $x > -2$
$\implies x+2 > 0 \implies |x+2| = x+2$. Therefore $\left|\dfrac{x+1}{|x|+|x+2|}\right| = \dfrac{|x+1|}{\left||x|+|x+2|\right|}$

$= \dfrac{-(x+1)}{|-(x)+(x+2)|} = -\dfrac{x+1}{|2|} = -\dfrac{x+1}{2}$

Math 001.26 **Quiz # 1** **Sem. I , Sep 27 , 2006**

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Complete the following, **show your work** and **simplify** your answer:

- In the product $(2-3x)(2x^3-4x-5)(2+3x)$, the leading coefficient is $\cdots\cdots$ and the degree is $\cdots\cdots$

Ans : $=(2-3x)(2+3x)(2x^3-4x-5)=(4-9x^2)(2x^3-4x-5)$, so the leading term is $(-9x^2)(2x^3)$

$=-18x^5 \implies$ the leading coefficient $=-18$ and the degree $=5$

- In the set $=\left\{\frac{2}{0}\ ,\ \frac{\sqrt[3]{16}}{\sqrt[3]{54}}\ ,\ \frac{0.5\pi}{-3\pi}\ ,\ 0.353553555\ldots\ldots\ ,\ -29.8095937\ ,\ \frac{\sqrt{4}}{\sqrt{2}}\right\}$

the rational number(s) is (are) $\cdots\cdots\cdots\cdots$

Ans : $\frac{2}{0}\notin\Re$, $0.353553555\ldots\ldots$ (not terminating and not repeating decimal) and $\frac{\sqrt{4}}{\sqrt{2}}=\frac{2}{\sqrt{2}}$

are irrationals. The rational numbers are $\frac{\sqrt[3]{16}}{\sqrt[3]{54}}=\frac{2\sqrt[3]{2}}{3\sqrt[3]{3}}=\frac{2}{3}$, $\frac{0.5\pi}{-3\pi}=-\frac{0.5}{3}=-\frac{1}{6}$

and -29.8095937 (terminating decimal).

- $\mathrm{A}=\{x|x$ is a composite number $\le 16\}$, and
$\mathrm{B}=\{x|x$ is an even integer , $7\le x<19\}$, then find $\mathrm{A}\cap\mathrm{B}=\cdots\cdots\cdots$

Ans : $\mathrm{A}=\{4,6,8,9,10,12,14,15,16\}$, $\mathrm{B}=\{8,10,12,14,16,18\}$, and $\mathrm{A}\cap\mathrm{B}=\{8,10,12,14,16\}$

- When rationalized, the expression $\frac{\sqrt[5]{3}}{\sqrt[5]{4x^4y^3}}=\cdots\cdots\cdots$

Ans : $=\frac{\sqrt[5]{3}}{\sqrt[5]{2^2x^4y^3}}\cdot\frac{\sqrt[5]{2^3xy^2}}{\sqrt[5]{2^3xy^2}}=\frac{\sqrt[5]{24xy^2}}{2xy}$

- $-3<x<2$, then $\left|\frac{x+3}{|x-2|+|x+5|}\right|=\cdots\cdots\cdots$

Ans : $x>-3 \implies x+3>0 \implies |x+3|=x+3$, $x<-2 \implies x+2<0 \implies |x-2|$

$=-(x-2)$ and $x>-3 \implies x>-5 \implies x+5>0 \implies |x+5|=x+5$. Therefore

$$\left|\frac{x+3}{|x-2|+|x+5|}\right|=\frac{|x+3|}{\left||x-2|+|x+5|\right|}=\frac{x+3)}{|-(x-2)+(x+5)|}=\frac{x+3}{|7|}=\frac{x+3}{7}$$

Math 001.34 **Quiz # 1** **Sem. I , Sep 27 , 2006**

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Complete the following, **show your work** and **simplify** your answer:

- If $P(x)$ and $Q(x)$ are two polynomials both of degree 5, then the degree of $P(x)+Q(x)$ is $\cdots\cdots$ and the degree of $P(x)\cdot Q(x)$ is $\cdots\cdots$

Ans : The degree of $P(x)+Q(x) \le 5$ and the degree of $P(x)\cdot Q(x)$ is $5+5=10$

- In the set $\left\{-\sqrt{-9}\ ,\ 5.223344\ldots\ ,\ \frac{22}{7}\ ,\ \frac{\sqrt{25}}{\sqrt{24}}\ ,\ \frac{\pi}{\pi+1}\ ,\ 75.646464\ldots\right\}$, the **irrational** number(s) is (are) $\cdots\cdots\cdots$

Ans : $-\sqrt{-9} \notin \Re$, $\frac{22}{7}$ and $75.646464\ldots$ (repeating decimal) are rationals. The irrational numbers are $5.223344\ldots$ (not terminating and not repeating decimal) , $\frac{\sqrt{25}}{\sqrt{24}} = \frac{5}{2\sqrt{6}}$ and $\frac{\pi}{\pi+1}$

- $(1-2x)^3 - 2(3-2x)(3+2x) = \cdots\cdots\cdots$

Ans : $= \left[1 - 3(1)^2(2x) + 3(1)(2x)^2 - (2x)^3\right] - 2\left(9 - 4x^2\right)$

$= \left(1 - 6x + 12x^2 - 8x^3\right) - 18 + 8x^2 = -8x^3 + 20x^2 - 6x - 17$

- When rationalized, the expression $\frac{\sqrt{2}}{\sqrt[3]{4}} = \cdots\cdots\cdots$

Ans : $= \frac{\sqrt{2}}{\sqrt[3]{2^2}} \cdot \frac{\sqrt[3]{2}}{\sqrt[3]{2}} = \frac{\sqrt{2}\ \sqrt[3]{2}}{2} = \frac{2^{\frac{1}{2}}\ 2^{\frac{1}{3}}}{2} = \frac{2^{\frac{5}{6}}}{2} = \frac{\sqrt[6]{2^5}}{2} = \frac{\sqrt[6]{32}}{2}$

- If $-3 < x < 0$, then $|x-2| + |-x-3| + \frac{|3x|}{x} = \cdots\cdots\cdots$

Ans : $= |x-2| + \left|-(x+3)\right| + \frac{3|x|}{x} = |x-2| + |x+3| + \frac{3|x|}{x}$

Now: $x<0 \implies x-2<0 \implies |x-2| = -(x-2)$, $x>-3 \implies x+3>0 \implies |x+3| = x+3$ and $x<0 \implies |x| = -x$. So the expression $= -(x-2) + (x+3) + \frac{-3x}{x}$

$= -x + 2 + x + 3 - 3 = 2$