King Fahd University of Petroleum and Minerals
Prep.-Year Math I (032)
Class Test I

Student's Name: KEY **ID:** _____ **Sec:** _____

Part I: MULTIPLE-CHOICE **(2 points each)**

1) If $a=\frac{2bc}{b-c}$, then $c =$

$ab - ac = 2bc$
$ab = ac + 2bc$
$ab = (a+2b)c$
$c = \frac{ab}{a+2b}$

(a) $\frac{a+2b}{ab}$

(b) $\frac{ab-ac}{2b}$

(c) $\frac{ab}{a+2b}$

(d) $\frac{ab+c}{b}$

2) Which one of the following statements is **TRUE?**

(a) $-3^0 = -1$

(b) $\left(5^3\right)^9 = 5^{12}$

(c) $(-4)^5(-4)^2 = 16^7$

(d) $4^{-1} + 3^{-1} = 7^{-1}$

3) The expression $\frac{x-1}{x-\sqrt{x}}$ simplifies to

$\frac{x-1}{x-\sqrt{x}} \cdot \frac{x+\sqrt{x}}{x+\sqrt{x}}$
$= \frac{(x-1)(x+\sqrt{x})}{x^2-x}$
$= \frac{(x-1)(x+\sqrt{x})}{x(x-1)}$
$= \frac{x+\sqrt{x}}{x}$

(a) $\frac{x+\sqrt{x}}{x}$

(b) $\frac{x^2+2\sqrt{x}}{2x}$

(c) $\frac{x+1}{x}$

(d) $\frac{x+\sqrt{x}}{x+1}$

4) Which one of the following expressions is a polynomial of degree 4?

(a) $-3xyz^2 + 12x + 4y + 1$

(b) $2x^{-1}y^2z^3 + 2z^4 + 3$

(c) $5x^3y^{-2}z^3 + 3x^2y^2 + 11$

(d) $11x^5z + 4x^2yz^4 - 1$

5) If the real number x is more than 3 units from 4 but less than 6 units from 4, then:

$3 < |x-4| < 6$

(a) $3 < |x-4| < 6$

(b) $|x-4| > 3$ or $|x-4| < 6$

(c) $3 \le |x-4| \le 6$

(d) $|x-4| \ge 3$ or $|x-4| \le 6$

6) Which one of the following statements is **TRUE?**

(a) The multiplicative inverse of an irrational number is an irrational number

(b) The number 10.34×10^{-5} is in scientific notation

(c) The sum of two odd numbers is an odd number

(d) The difference of two composite numbers is a composite number

7) The equation $\frac{3}{p+4}+\frac{4}{p+3}=\frac{4}{p^2+7p+12}$ has

$3(p+3)+4(p+4)=4$, $p\neq-4$, $p\neq-3$

$7p+25=4$

$7p=-21$

$p=-3$ that is rejected

(a) One positive real solution

(b) Two teal solutions

(c) One negative real solution

(d) No solution

8) If 1 is a solution for the equation $(2x-1)(3x+2)=-5k$, then $k=$

$(2(1)-1)(3(1)+2)=-5k$

$5=-5k \Rightarrow k=-1$

(a) 3

(b) -2

(c) -1

(d) 1

9) The equation $|x|+3x-9=0$ has

$x+3x-9=0$, if $x>0$

$x=9/4$, $x>0$ O.K.

or $-x+3x-9=0$, if $x<0$

$2x-9=0$

$x=\frac{9}{2}$, $x<0$ contradiction

$\Rightarrow x=\frac{9}{2}$ is rejected

(a) Two positive real solutions

(b) Two negative real solutions

(c) One real solution

(d) No real solution

Part II: Written

1) Write each of the following expressions without the absolute value symbols

(6 points)

a. $4\left|\frac{7}{2}-x\right|+2\left|x-\frac{9}{2}\right|$, given that $-4<x<-3$

$4\left(\frac{7}{2}-x\right)-2\left(x-\frac{9}{2}\right)$

$= 14-4x-2x+9$

$= 23-6x$.

b. $\sqrt{m^2-2mn+n^2}+\sqrt[3]{(m-n)^3}$, given that $m<n$

$= \sqrt{(m-n)^2}+m-n = |m-n|+m-n$

$= -(m-n)+m-n$

$= -m+n+m-n = 0$

2) Simplify $-\left(-8x^3+3x+1\right)-[(8x^3+x^2)-(4x^2+3x+1)]$ **(3 points)**

and write the answer in standard form.

$8x^3-3x-1-8x^3-x^2+4x^2+3x+1$

$= 3x^2$.

3) Factor $6x^2 - 19xy + 10y^2 - 2x + 5y$ completely **(3 points)**

$2x \quad -5y$

$3x \quad -2y$

$= (2x-5y)(3x-2y) - (2x-5y)$

$= (2x-5y)(3x-2y-1)$

4) Simplify $\frac{2}{\sqrt[3]{54}} - \frac{4}{\sqrt[3]{16}} - \frac{1}{\sqrt[3]{2}}$ and write your answer in simplest form. **(4 points)**

$\Rightarrow \frac{2}{3\sqrt[3]{2}} - \frac{4}{2\sqrt[3]{2}} - \frac{1}{\sqrt[3]{2}} = \frac{4-12-6}{6\sqrt[3]{2}} = \frac{-14}{6\sqrt[3]{2}}$

$= \frac{-7}{3\sqrt[3]{2}} \frac{\sqrt[3]{4}}{\sqrt[3]{4}} = \frac{-7\sqrt[3]{4}}{6}$

rationalize

5) Simplify $\left[\dfrac{\left(3^2x^{-2}\right)^{-1}\left(3x^{5}\right)^{-2}}{\left(3^{-4}x^{-2}\right)^{2}}\right]^{\frac{1}{4}}$ **(4 points)**

$$= \left(\frac{3^{-2}\,x^{-2}\,3^{-2}\,x^{-10}}{3^{8}\,x^{4}}\right)^{\frac{1}{4}} = \left(3^{-16}x^{-16}\right)^{\frac{1}{4}} = \sqrt[4]{\left(\frac{3}{x^2}\right)^4}$$

$$= \left|\frac{3}{x^2}\right| = \frac{3}{x^2}$$

6) Write the complex number $\dfrac{(1-2i)^2}{-\sqrt{-9}\sqrt{-1}+4i^{33}}$ in standard from. **(5 points)**

$$= \frac{1-4i+4i^2}{-3i\cdot i+4i} = \frac{-3-4i}{3+4i}\cdot\frac{3-4i}{3-4i}$$

$$= \frac{-9+12i-12i+16i^2}{9-16i^2}$$

$$= \frac{-25}{25} = -1$$

$$= -1+0i$$

7) Simplify $\left(16x^2-9y^2\right)\div\left(64x^3-27y^3\right)$ **(5 points)**

$$= \frac{(4x)^2-(3y)^2}{(4x)^3-(3y)^3}$$

$$= \frac{(4x-3y)(4x+3y)}{(4x-3y)(16x^2+12xy+9y^2)}$$

$$= \frac{4x+3y}{16x^2+12xy+9y^2}$$

8) Solve $3x^2-9x+3=x+2$ by completing the square method. **(5 points)**

$$3x^2-10x=-1$$

$$x^2-\frac{10}{3}x=-\frac{1}{3}$$

$$x^2-\frac{10}{3}x+\frac{25}{9}=-\frac{1}{3}+\frac{25}{9}$$

$$\left(x-\frac{5}{3}\right)^2=\frac{-3+25}{9}$$

$$x-\frac{5}{3}=\pm\frac{\sqrt{22}}{3}$$

$$x=\frac{5}{3}\pm\frac{\sqrt{22}}{3}$$

9) Find all solutions of the equation $\sqrt{4x+1}-\sqrt{2x+4}=1$ **(5 points)**

$$(\sqrt{4x+1})^2 = (\sqrt{2x+4}+1)^2$$

$$4x+1 = 2x+4+2\sqrt{2x+4}+1$$

$$2x-4 = 2\sqrt{2x+4}$$

$$(x-2)^2 = (\sqrt{2x+4})^2$$

$$x^2-4x+4 = 2x+4$$

$$x^2-6x = 0$$

$$x(x-6) = 0$$

$\boxed{x=0}$ or $\boxed{x=6}$

check: $x=0$ is rejected

$x=6$ is a solution