King Fahd University of Petroleum and Minerals
Prep-Year Math Program

Prep-Year Math I
MIDTERM EXAM
Semester I, Term 061
Tuesday, November 14, 2006
Net Time Allowed: 120 minutes

"Sources Of Problems"

MASTER VERSION

1. The number $\dfrac{(6.9 \times 10^{29})(7.5 \times 10^{-14})}{0.023 \times 10^{16}}$ written in scientific notation is given by

(a) 2.25×10^{2}

See Example 3 P.23

See Problems 45 & 48 P.32

(b) 22.25×10^{6}

(c) 2.25×10^{-2}

(d) 0.225×10^{4}

(e) 2.25×10^{-5}

2. The value of the expression

$$-17 + 3[8x - 4(3x - 2)] \quad \text{when} \quad x = -\frac{3}{4}$$

is

see Example 9 P.13

see problems 105 and 106 P.17

(a) 16

(b) -11

(c) 22

(d) -5

(e) 13

3. The solution set, in interval notation, of the inequality

$$\frac{2x-3}{x^2-36} \leq \frac{1}{x+6}$$

is

See example 5 p. 135

See problems 37 to 50 p.140

(a) $(-\infty, -6) \cup [-3, 6)$

(b) $(-\infty, -6) \cup [-3, \infty)$

(c) $(-6, -3] \cup (6, \infty)$

(d) $(-2, 2)$

(e) $(-\infty, -3]$

4. For $x > 0$ and $y > 0$, the expression

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

simplifies to

See example 4 p. 26

See problems 59 to 70 p.32

(a) $\frac{y^2}{x^6}$

(b) $\frac{y}{x^3}$

(c) $\frac{x^2}{y^6}$

(d) x^2y^3

(e) xy^4

5. If A is the leading coefficient and B is the constant term of the polynomial $(4x-1)^2-(2x-3)^2$, then $A+B$ is equal to

see example 1 p. 36

See problems 11 to 16 p. 41

(a) 4

(b) 20

(c) 16

(d) 5

(e) -6

6. One factor of $5x^3y-5xy^3+6x^2y-6xy^2$ is

(a) $5x+5y+6$

see example 9 p. 51

See problems 63 to 68 p. 54

(b) $5x-5y+6$

(c) $5x-5y-6$

(d) $5x+5y-6$

(e) $5x+5y+11$

7. The possible value(s) of k that makes the trinomial $25x^2 + kxy + 64y^2$ a perfect square is(are)

(a) ± 80

(b) 40

(c) -40

(d) ± 160

(e) 13

see example 7 p. 50

see problems 47 to 54 p.54

8. The expression

$$\frac{y}{y^2-2y-8} - \frac{2}{y^2-5y+4} + \frac{1}{y^2+y-2}$$

simplifies to

(a) $\dfrac{1}{y-1}$

(b) $\dfrac{1}{y+2}$

(c) $\dfrac{y}{y-4}$

(d) $\dfrac{(y-4)}{(y+4)(y-1)}$

(e) $\dfrac{(y-2)}{(y+2)(y-4)}$

see problems 37 and 38 p.63

9. The expression

$$\frac{-1}{x+1} + \frac{x^3+64}{x^2} \div \frac{x^2-4x+16}{x}$$

simplifies to

(a) $\dfrac{(x+2)^2}{x(x+1)}$

see problems 33 to 36 p.63

(b) $\dfrac{x+2}{x^2(x+1)^2}$

(c) $\dfrac{(x+2)^2}{x^2(x+1)}$

(d) $\dfrac{x+7}{x(x+1)}$

(e) $\dfrac{x^2-8x+5}{x(x+1)}$

10. If $i=\sqrt{-1}$, $z_1 = \frac{8-i}{2+3i}$, and $z_2 = i^{-83}$, then $z_1+z_2 =$

(a) $1-i$

See examples 4 p.70 and 5 p.71

See problems 41 to 62 p.72

(b) $1-4i$

(c) $1+3i$

(d) $\dfrac{13}{-5} + \dfrac{31i}{5}$

(e) $-1+3i$

11. The expression

$$\frac{2+(x-2)^{-1}}{3-2(2-x)^{-1}}$$

simplifies to

See example 4 P.60

See problems 41 & 54 P.63

(a) $\dfrac{2x-3}{3x-4}$

(b) $\dfrac{3}{5}$

(c) $\dfrac{2x+5}{-3x-4}$

(d) $\dfrac{2x-5}{-3x+4}$

(e) $\dfrac{2x+3}{3x-4}$

12. The solution set, in interval notation, of the compound inequality

$$2x-4<8 \quad \text{and} \quad -2x+1\leq 5$$

is

see example 2 P.130

See problems 9 & 16 P.140

(a) $[-2,6)$

(b) $(-\infty,6)$

(c) $[-2,\infty)$

(d) $(-\infty,-2]\cup(6,\infty)$

(e) $(6,\infty)$

13. The solution set of the equation

$$\sqrt{x+9} - 3 = x$$

contains

see example 6 p. 122
see problems 29 and 30 p. 126

~~(a)~~ one rational number

(b) two rational numbers

(c) one positive rational number

(d) no real numbers

(e) one negative rational number

14. The length (L) of a rectangle is 2 units less than twice the width (W) of the rectangle. If the perimeter of the rectangle is 110 units, then $L - W$ is equal to

~~(a)~~ 17

see example 3 p. 93
see problems 19 and 20 p. 99

(b) 16

(c) 50

(d) 19

(e) 53

15. The value of k for which the quadratic equation

$$kx^2 + 3kx + (2k+1) = 0$$

has two equal solutions is

see example 6 p. 109

see problems 47 to 56 p. 113

~~(a)~~ 4

(b) 0

(c) -4

(d) 1

(e) 2

16. If $(a+c)x + x^2 = (x+a)^2$, then $x =$

see example 1 p. 91

see problems 4 to 10 p. 98

~~(a)~~ $\frac{a^2}{c-a}$

(b) $\frac{a^2}{3a+c}$

(c) $\frac{a^2}{a+c}$

(d) $\frac{a^2+2a}{a+c}$

(e) $\frac{a^2}{3c-a}$

17. The solutions of the equation

$$\frac{1}{2}x^2 + \frac{4}{3}x + 1 = 0$$

are

See problems 25, 26, 32, 36, 39, 40, 41, 42 p. 113

~~(a)~~ $-\frac{4}{3} \pm \frac{\sqrt{2}}{3}i$

(b) $-\frac{4}{3} \pm \frac{\sqrt{3}}{3}i$

(c) $\frac{4}{3} \pm \frac{2\sqrt{2}}{3}i$

(d) $-\frac{4}{3} \pm \frac{\sqrt{5}}{3}i$

(e) $-\frac{2}{3} \pm \frac{\sqrt{2}}{6}i$

18. The solution set of the equation

$$\frac{2|x+2|}{3} - \frac{1}{2} = \frac{4x+5}{6}$$

is equal to

see problems 61 to 66 p. 90

~~(a)~~ $[-2, \infty)$

(b) $(-\infty, +\infty)$

(c) $\{-2\}$

(d) the empty set ϕ

(e) $(-\infty, -2]$

19. If the equation $(3x-4)(x+1) = -2$ is written in the form $(x+m)^2 = n$, then $m+n$ is equal to

~~(a)~~ $\frac{19}{36}$

(b) 1

(c) $\frac{-2}{3}$

(d) $\frac{35}{36}$

(e) -1

see examples 3 and 4 p. 106-107

see problems 21 to 32 p. 113

20. If the sum and the product of the two roots of the equation $2x^2 + bx + c = 0$ are -4, and $-\frac{3}{2}$ respectively, then $b+c$ is equal to

~~(a)~~ 5

(b) $\frac{-7}{2}$

(c) 11

(d) -6

(e) 6

see problems 82 to 86 p. 116

21. The sum of the real solutions of the equation

$$\frac{1}{x^6} + \frac{9}{x^3} + 8 = 0$$

is

See examples 8 and 9 p.123-124

See problems 41 to 56 p.126

~~(a)~~ $\frac{-3}{2}$

(b) $\frac{-9}{8}$

(c) -9

(d) $\frac{1}{2}$

(e) $\frac{-1}{2}$

22. Which one of the following equations is **NOT** an **Identity**?

See example 4 p.85

See problems 23 to 32 p.88

~~(a)~~ $\frac{x+2}{x+4} = \frac{1}{2}$

(b) $6x - 5 = -3(1 - 2x) - 2$

(c) $\frac{4}{4x^2 + 8} = \frac{-2}{-4 - 2x^2}$

(d) $(x-3)^2 = x^2 - 6x + 9$

(e) $\frac{1}{3}x + 2 = \frac{x+6}{3}$

23. The **sum** of the **real part** and the **imaginary part** of the complex number $\dfrac{\sqrt{-4}(\sqrt[3]{-27}-\sqrt{-16})}{(1+i)^2}$ is equal to

(a) -7

(b) 1

(c) -1

(d) -2

(e) $4i$

See the examples on the Real and Imaginary Parts of a Complex number p. 66.

Also see examples 1 and 3 p. 67 and 69

See problems 23, 24, 33 to 36 p. 72

24. The expression

$$5x\sqrt[3]{24x^4}+\frac{21x^3}{\sqrt[3]{-9x^2}}$$

simplifies to

(a) $3x^2\sqrt[3]{3x}$

(b) $-16x^2\sqrt[3]{3x}$

(c) $11x^2\sqrt[3]{9x^2}$

(d) $3x^2\sqrt[3]{9x^2}$

(e) $-4x^2\sqrt[3]{3x}$

See examples 6 and 8 p. 29-30.

See problems 81 to 88 p. 32

& 105 and 106 p. 33

25. The solution set, in interval notation, of the inequality $2 < |x - 1| < 3$ is equal to

(a) $(-2, -1) \cup (3, 4)$ See Problems 73 to 78 P.143

(b) $(-\infty, -2) \cup (4, \infty)$

(c) $(-1, 3)$

(d) $(-2, 4)$

(e) $(-2, -1) \cup (3, \infty)$