Mahidol University International College

ICNS 015 Refresher Mathematics

Midterm Exam, Trimester 2, 2016-17

Saturday 18 February 2017 10:00 – 11:50 75 points, 35%

Name: _____ I.D.: _____

Section: _____ Seat: _____

Directions: This exam contains 12 pages and 27 questions. Points for each question are indicated in the square brackets. **Show your work in every question clearly.** A calculator is NOT allowed for this exam. **Write your name, ID, etc on every odd page.**

Part I

Show your work. Write your final answers in the spaces provided on the right.

1. Consider the following statements: **[1]**

   A. -4 is a rational number

   B. $\frac{2}{1}$ is an integer

   C. Every rational number is an integer

   D. $\frac{-\pi}{6}$ is an irrational number

   Which statements are correct?

   1. _____

2. The additive inverse of 2 is **[1]**

   2. _____

3. Simplify $\dfrac{14x}{\dfrac{7}{y}}$ to one fraction. **[1]**

   3. _____

4. Find the value and simplify: $(25)^{3/2}$ **[1]**

   4. _____

5. What property of real number allows us to write $(b+c)a = (c+b)a$? **[1]**

   A. associative

   B. identity

   C. distributive

   D. commutative

   E. none of the above

5. _____

6. $\dfrac{x^{-4}x^{-2}}{y^{-7}y^{5}} =$ **[1]**

   A. x^8y^{35}

   B. $\dfrac{1}{x^6y^2}$

   C. x^6y^2

   D. $\dfrac{y^2}{x^6}$

   E. $\dfrac{x^6}{y^2}$

6. _____

7. The multiplicative inverse of $-\dfrac{2}{3}$ is **[1]**

7. _____

8. Simplify $\dfrac{\dfrac{x}{2}}{4y}$ to one fraction. **[1]**

8. _____

9. Suppose that $\sqrt[3]{x^4y^5}$ simplifies to x^ay^b where a, b are rational numbers. Then $a+b =$ **[2]**

9. _____

10. What property of real number allows us to write $(e + a)b = e \times b + a \times b$? **[1]**

A. associative

B. identity

C. distributive

D. commutative

E. none of the above

10. _____

11. Find the value and simplify: $(-8)^{4/3}$ **[1]**

11. _____

12. Find the value and simplify: $\left(\frac{25}{4}\right)^{-1/2}$ **[1]**

12. _____

13. Simplify the following. Express your final answer with no radical in the denominator. **[4]**

$$\frac{\sqrt[4]{16x^4y^2}}{\sqrt[4]{2x^2y^3}}$$

13. _____

14. What property of real number allows us to write $6(ab) = (6a)b$? **[1]**

A. associative

B. identity

C. distributive

D. commutative

E. none of the above

14. _____

15. Find the value and simplify: $\sqrt[5]{(64)^{5/6}}$ **[1]**

15. _____

16. Find the value and simplify: $30 \div 2 - 4 \cdot 3 + 2$ **[1]**

16. _____

17. Simplify and express your answer in terms of positive exponents: **[4]**

$$\left(\frac{(a^2b)^2c^{-2}}{a^{-1}bc^2}\right)^3$$

17. _____

Part II

Show your work clearly.

18. Multiply and simplify **[3]**

$$(\sqrt{x+10}-5)(\sqrt{x+10}+5)(x+3)$$

19. Use **the long division** to divide **[3]**

$$(x^4-3x^2+5x-8) \div (x^2-2)$$

20. Divide and simplify the following expression. Express your final answer in terms of positive exponents. **[3]**

$$\frac{24x^5y^{-3} - 8x^4y^{-6} + 12x^{-7}y^2}{8x^4y^{-6}}$$

21. Factor

(a) $x^2 + 4x - 32$ **[1]**

(b) $15x^2 + 24x - 12$ **[2]**

22. Perform the indicated operations and simplify

(a) [4]

$$\frac{x+1}{x^2-25} - \frac{2}{x^2-2x-15}$$

(b) [4]

$$\left(\frac{x^2-9}{x^2-x-6}\right) \div \left(\frac{x^2-16}{x^2+6x+8}\right)$$

23. Simplify the following expression. Your final answer should contain only one fraction. **[4]**

$$\frac{3+\dfrac{9}{x}}{x+\dfrac{x}{x+2}}$$

24. Completely factor and simplify the following expression **[3]**

$$\frac{3ma-3mb-2ab+2b^2}{3m-2b}$$

Part III

Show your work clearly.

25. Solve the following equations:

(a) **[3]**

$$y = \frac{4}{3}y - 5$$

(b) **[3]**

$$x - \frac{x}{2} + \frac{x}{3} - \frac{x}{4} = \frac{1}{12}$$

26. Suppose that

$$P\left(1+\frac{S}{100}\right)-R=0.$$

(a) Express P in terms of the remaining letters. Your final answer should contain only one fraction. **[2]**

(b) Express S in terms of the remaining letters. Your final answer should contain only one fraction. **[2]**

27. Solve the following equations:

(a) **[3]**

$$(x-1)(x-2)=6$$

(b) **[3]**

$$x^2=\frac{x+3}{2}$$

(c) [4]

$$\frac{y-1}{y-2}+\frac{y-3}{y-4}=\frac{y-5}{y^2-6y+8}$$

(d) [4]

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