

**Mahidol University International College**  
**ICNS 015 Refresher Mathematics**  
**Final Exam, Trimester 2, 2016-17**

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Saturday 8 April 2017

10:00 – 11:50

73 points, 40%

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Name: \_\_\_\_\_ I.D.: \_\_\_\_\_

Section: \_\_\_\_\_ Seat: \_\_\_\_\_

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**Directions:** This exam contains 12 pages and 19 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**

1. Let  $f(x) = \frac{(x+1)!}{(x-1)!} - |2-x|$ . Find  $f(4)$ . [2]

2. Find the domain of each function.

(a)  $f(x) = \frac{x}{x^2 + x - 2}$  [2]

(b)  $g(x) = \frac{x-1}{\sqrt{6-2x}} + \frac{6}{x}$  [3]

3. A recipe for pastry has flour, butter and water mixed in the ratio 23 : 7 : 5. If Anna follows the recipe and uses 7 cups of flour, how many cups of water should she use? [2]

4. Let  $f(x) = x - x^2$ . Write the following expression in simplest form. [3]

$$\frac{f(x + 2h) - f(x)}{h}$$

5. Which equation(s) below defines  $y$  as a function of  $x$ ? Circle all correct choices. [1]

- A.  $y^2 = 5 - x$
- B.  $x - 2 = |y|$
- C.  $y - 1 = \sqrt{x}$
- D.  $y = 7 - x^2$

6. Let  $f(x) = \begin{cases} x + 5 & , x < 2 \\ 2x - 15 & , x \geq 2 \end{cases}$  and  $g(x) = 1 - 2x$  and  $h(x) = |1 - x|$ . Find the following.

(a)  $(f - g)(2)$

[2]

(b)  $\left(\frac{f}{h}\right)(2)$

[2]

(c)  $(g \circ f \circ h)(5)$

[2]

(d)  $(h \circ g^{-1})(3)$

[2]

7. The “current ratio” of a company is the ratio of its current assets to its current liabilities. Suppose a company has current assets of \$25,000 and current liabilities of \$10,000.
- (a) What is the current ratio of this company? [1]

- (b) If the company wants to make a short-term loan and have their current ratio no less than 2.2, what is the maximum amount it can borrow? (*Note: The funds they receive are considered as current assets and the loan as a current liability.*) [3]

**Part II**

8. Find the inverse function of  $h(x) = \sqrt[3]{5x + 3}$ .

[3]

9. Solve for  $x$ . Write your final answer in **interval notation**.

[4]

$$\frac{x^2 + 7x + 12}{2x^2 + 4x + 2} \geq 0$$

10. Solve for  $x$ . Write your final answer in **interval notation**.

[4]

$$\frac{-4x - 6}{5} \leq 4x + 8$$

11. If 30% of  $(A - B)$  equals to 20% of  $(A + B)$ , then what % of  $A$  is equal to  $B$ ?

[2]

12. If the price of a book becomes 1,215 Baht after receiving 15% discount from the original selling price. Find the original selling price of this book. [2]

13. A couple invested their money \$45,000 for buying their dream house. They invested some amount at an interest rate of 7% per year and the remaining amount at 8% per year. The total interest at the end of one year was equal to investing \$45,000 in a 12-month fixed deposit that yield 7.25% per year. How much did the couple invest in the 7% return investment? [4]

14. You are planning to sell Caramel Pop Corn in MUIC Carnival. You have to buy a popcorn machine. The cost for this machine is paid once as a fixed cost of 5,000 Baht. The ingredients and packaging for each bag of popcorn cost 15 Baht. You plan to sell each bag of popcorn for 35 Baht. How many bags of popcorn do you need to sell to have 3,000 Baht profit?

[4]



**Part III**

You may find the following formulas useful.

$$\bullet \sum_{i=1}^n i = \frac{n(n+1)}{2}$$

$$\bullet \sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$$

$$\bullet \sum_{i=1}^n i^3 = \left(\frac{n(n+1)}{2}\right)^2$$

15. Solve for  $x$ .

$$(a) \quad |-4|x^2 + \left|\frac{1}{2} - \frac{13}{4}\right| = \frac{47}{4} \quad [4]$$

$$(b) \quad |2x - 1| = 3x - 4 \quad [4]$$

16. Solve for  $x$ . Give your answers in **interval notation**.

(a)  $\left| \frac{x-7}{3} \right| \geq 5$

[4]

(b)  $-2|2-3x|+9 > 1$

[4]

17. Evaluate and simplify  $\sum_{i=1}^{15} (2 - i)(2 + i)$ .

**[3]**

18. Evaluate and simplify  $\sum_{k=5}^{20} \left( \frac{nk}{4} - 3n \right)$ .

**[3]**

19. Evaluate and simplify  $\sum_{k=1}^{10} \left( \frac{2k^3 - 4k + 5}{10} \right)$ .

**[3]**