Camosun College
Department of Mathematics
Math 107 Practice Final
PART 1 of 2

Instructor: Susie Wieler

Name:_____

Total Marks: [43]

Instructions:

- You have a total of 3 hours to write the exam.

- DO NOT start the exam until instructed to do so.

- Check that this booklet contains 10 questions (numbered 1-10).

- The only permissible calculator is the SHARP EL-531W, EL-531-X or EL-510R.

- Show all your work in the space provided. Marks will be deducted for incomplete work.

- NO DECIMALS are to be used in any answer, unless otherwise stated.

- This is PART 1 of your exam. Once you have finished it you may hand it in and have a break. If you do not wish to take a break, you may request PART 2 and keep PART 1 on your desk.

1. Solve $-2(x + 3) < 8$.   [3]

2. Solve $2 + \sqrt{4 - 2x} = x$.   [3]

3. Find the equation of the line parallel to $2x + y = 2$ and containing the point $(4, 0)$. Leave your answer in slope-intercept form. [3]

4. Consider the equation $9x^2 - 18x + 4y^2 + 16y = 11$. Complete the square in both x and y and determine if the graph of this equation is a circle or an ellipse (you do not have to graph it). [3]

5. Let $f(x) = 4x + 3$. Find and simplify [3]

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

6. Let $f(x) = x^2 + 2x$.

    a) Graph $f(x)$. Label the y-intercept, x-intercepts, and vertex.   [3]

    b) Determine the domain and range of $f(x)$.   [2]

    c) Determine where $f(x)$ is increasing and where it is decreasing.   [2]

7. A farmer wishes to enclose a rectangular area with 200m of fencing.

   a) Express the area A of the rectangle as a function of the width w of the rectangle.

   [1]

   b) For what value of w is the area largest? [3]

   c) What is the maximum area? [1]

8. Let $f(x) = x^3 + 4x^2 + 4x$.

    a) Factor $x^3 + 4x^2 + 4x$.   [2]

    b) Graph $f(x)$. Label all the x-intercepts.   [3]

    c) Solve $f(x) > 0$.   [1]

9. Using an equation or a graph, provide an example of a one-to-one function. [2]

10. a) Graph $f(x) = 2^x$. Label at least three points on the graph. [2]

b) Graph $g(x) = \log_2 x$. Label at least three points on the graph. [2]

c) Graph $h(x) = \log_2(x + 1) - 2$. Label the asymptote, x-intercept, and y-intercept. Find the domain and range of $h(x)$. [4]

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PART 2 of 2

Instructor: Susie Wieler

Name:_____

Total Marks: [37]

Instructions:

- Check that this booklet contains 7 questions (numbered 11-18).

- The only permissible calculator is the SHARP EL-531W, EL-531-X or EL-510R.

- Show all your work in the space provided. Marks will be deducted for incomplete work.

- NO DECIMALS are to be used in any answer, unless otherwise stated.

11. Solve $\log_2(2x + 1) = 3$. [3]

12. The population of a colony of mosquitoes obeys the law of uninhibited/exponential growth.

a) If there are 2000 mosquitoes initially and there are 2700 mosquitoes after 1 day, what is the size of the colony after 5 days? [3]

b) How long is it until there are 50,000 mosquitoes? [2]

13. Let $\cos \theta = \frac{3}{5}$ and let θ be in Quadrant IV. Find $\sin \theta$ and $\tan \theta$. [3]

14. The point $(-\frac{\sqrt{5}}{3}, \frac{2}{3})$ is on the unit circle and on the terminal side of an angle θ.

    a) In which quadrant is θ? [1]

    b) Find the exact value of $\cot \theta$. Remember to rationalize the denominator if necessary.

    [2]

15. Graph $f(\theta) = 3\sin(\pi\theta - 2) + 1$. Label at least six points on the graph. [5]

16. Find the exact value of $\sin^{-1}(\sin\frac{3\pi}{4}) + \tan(\tan^{-1}\frac{3}{2})$. [4]

17. a) Derive the following double-angle formula: [3]

$$\cos(2\theta) = 1 - 2\sin^2\theta.$$

b) Use part a) to solve $\cos(2\theta) + 6\sin^2\theta = 4$ on the interval $0 \le \theta < 2\pi$. [4]

18. Consider the sequence
$$3, 6, 12, 24, \cdots .$$

a) Determine if this sequence is arithmetic, geometric, or neither. [2]

b) Find a formula for the nth term of this sequence. [2]

c) Find the 94th term of this sequence. [1]

d) Find the sum of the first 94 terms of this sequence. [2]