DAWSON COLLEGE

MATHEMATICS DEPARTMENT

Final Examination

Mathematics 201-016-RE
Remedial Activites for Secondary IV Mathematics

Date: Friday, December 22, 2023
Instructor: Mélanie Beck

1. ***(4 marks)*** Solve the following system using the method of your choice $\begin{cases} 2x+3y &= -5 \\ \frac{3}{2}x+2y &= -4 \end{cases}$

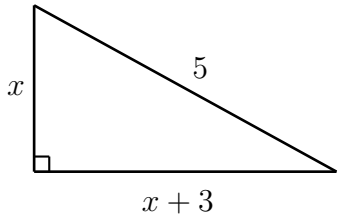
2. ***(4 marks)*** Rationalize the denominator and simplify the expression: $\dfrac{\sqrt{5}}{2+\sqrt{3}}$

3. ***(4 marks)*** Simplify the following expression (assume that all variables represent nonnegative real numbers): $5\sqrt{75m}-4\sqrt{27m}$

4. ***(4 marks)*** Simplify: $(3\sqrt{5}-4\sqrt{3})(2\sqrt{5}+3\sqrt{3})$

5. ***(6 marks)*** Give the coordinates of the vertex and of the intercept(s) and sketch the graph of
$$f(x)=x^2+4x+3.$$

6. ***(4 marks)*** Find the exact value of x in the following right-angle triangle.



7. ***(4 marks)*** At a local ball game the hotdogs sold for \$2.50 each and the hamburgers sold for \$2.75 each. There were 131 total sandwiches sold for a total value of \$342. How many of each sandwich was sold? Start your solution by defining clearly your variables.

8. ***(4 marks)*** Solve the inequality and express your answer in interval form.
$3(x-6)-5x \leq 9$

9. ***(4 marks)*** Simplify. Assume that all variables represent nonzero real numbers. Please specify which identity you use at each step.
$$\frac{(4\,x^4)^2}{32\,x^{11}\,y^{-2}\,y^{-5}\,z^0}=$$

10. ***(4 marks)*** Solve the equation: $2x-3(x+1)=4x-\dfrac{1}{2}$

11. ***(4 marks)*** Solve the equation: $\log_2(5-3x)=3$

12. ***(4 marks)*** Use logarithms to solve $5^x=9$, and round your final answer to the nearest hundredth.

13. ***(4 marks)*** Expand the expression and group like terms: $(x-7)^2(3x^2+5)$

14. (a) ***(2 marks)*** Find the x-intercept of the line $3x - 4y = 1$.

    (b) ***(2 marks)*** Write the equation of the line passing through the point $(-1, 2)$ with a slope of 4.

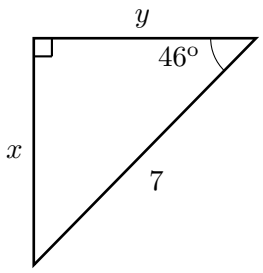
15. The cost of a long-distance phone call is \$0.52 for the first minute and \$0.29 for each **additional** minute.

    (a) ***(3 marks)*** If the total charge for a long-distance call was \$4.29, how many minutes was the call?

    (b) ***(1 marks)*** Write a linear function that calculates the cost of a long-distance phone call that last x minutes.

16. ***(4 marks)*** Solve the following formula for b: $A = \left(\dfrac{b+B}{2}\right) h$

17. ***(4 marks)*** Find x and y, and round your final answers to the nearest hundredth.



18. ***(4 marks)*** If $f(x) = 3x - \dfrac{x-1}{2}$, find and simplify

    (a) $f(5)$

    (b) $f(x+5)$

19. ***(4 marks)*** Factor a greatest common factor of $4x^3y + 8x^2y^3$.

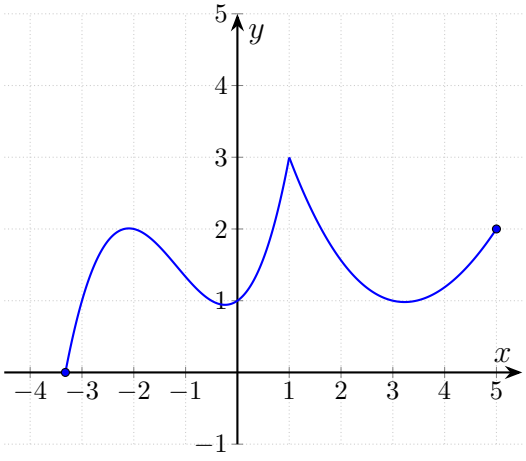
20. ***(4 marks)*** Factor and simplify $\dfrac{4x^2-1}{2x^2+x}$

21. ***(6 marks)*** Consider the following expressions.

$$A = x^3 - 3x^2 + 2x \quad \text{and} \quad B = x^2 - 4x + 4.$$

    Factor A and B as much as possible and use your results to add and simplify $\dfrac{3x+1}{A} - \dfrac{x}{B}$.

22. ***(4 marks)*** The graph of the function f is provided on the right.



    (a) Evaluate, if possible, $f(5)$.

    (b) Evaluate, if possible, $f(f(f(-3)))$.

    (c) Find all solutions, if any, of $f(x) = 3$.

    (d) Determine the range of the function.

23. ***(4 marks)*** Solve $2 + \sqrt{x-1} - 2x = 0$.

24. ***(4 marks)*** The height h in meter of a ball in a soccer game, t seconds after it is kicked is given by

$$h(t) = -3.5t^2 + 17.5t.$$

(a) When does the ball reach its maximum height?

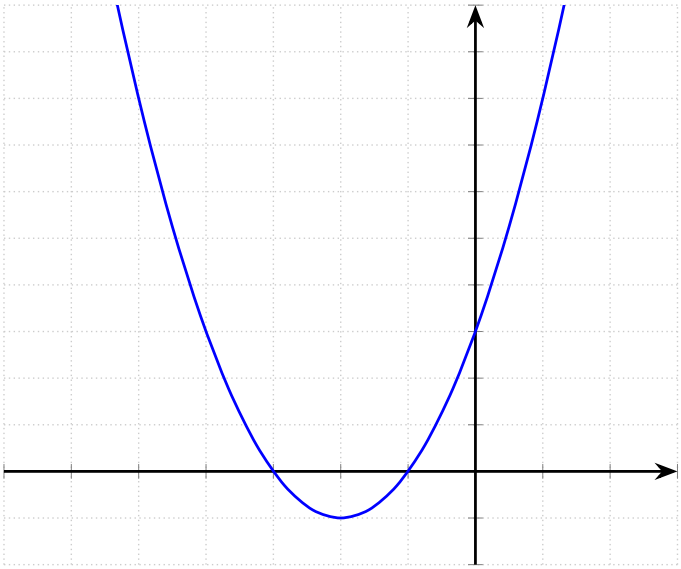
(b) What is the maximum height?

(c) After how many seconds the ball hits the ground?

ANSWERS:

1. $(-4, 1)$ **2.** $2\sqrt{5} - \sqrt{15}$ **3.** $13\sqrt{3m}$ **4.** $\sqrt{15} - 6$

5. vertex $(-2, -1)$, x-intercepts $(-1, 0)$ and $(-3, 0)$, y-intercept $(0, 3)$



6. $x = \dfrac{-3 + \sqrt{41}}{2}$ **7.** They sold 73 hotdogs and 58 burgers.

8. $[27/2, \infty)$ **9.** $\dfrac{y^7}{2x^3}$ **10.** $x = -1/2$ **11.** $x = -1$ **12.** $x = 1.37$

13. $3x^4 - 42x^3 + 152x^2 - 70x + 245$ **14.** a. $(1/3, 0)$ b. $y = 4x + 6$

15. a. The call was 14 minutes long. b. $f(x) = 0.29x + 0.23$

16. $b = \dfrac{2A}{H} - B$ **17.** $x = 5.04$ and $y = 4.86$ **18.** a. $f(5) = 13$ b. $f(x+5) = \dfrac{5}{2}x + 17$

19. $4x^2y(x + 2y^2)$ **20.** $\dfrac{2x-1}{x}$ **21.** $\dfrac{4x - 2 - x^3 + x^2}{x - 2}$

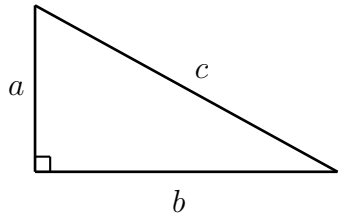
22. a. $f(5) = 2$, b. $f(f(f(-3))) = 1.25$ c. $x = 1$ d. $[0, 3]$ **23.** 1 and 5/4

24. a. The ball reaches its maximum height in 2.5 seconds. b. The maximum height is 21.87 meters. c. The ball hits the ground after 5 seconds.

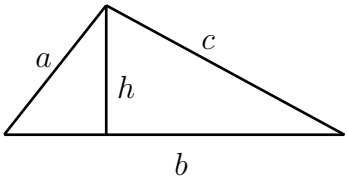
DAWSON COLLEGE

Mathematics 201-016-RE
Information Sheet

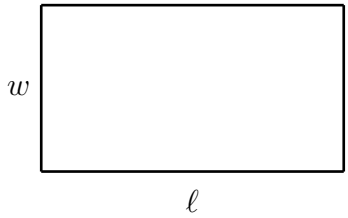
$$x^3 - y^3 = (x - y)(x^2 + xy + y^2)$$
$$x^3 + y^3 = (x + y)(x^2 - xy + y^2)$$



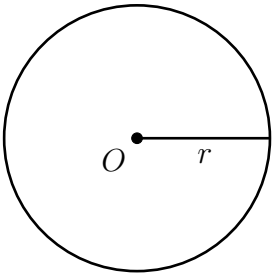
$$a^2 + b^2 = c^2$$



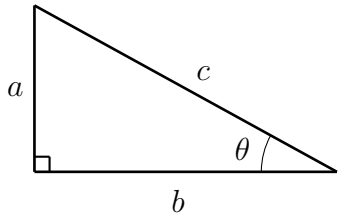
$$A = \frac{bh}{2}$$
$$P = a + b + c$$



$$A = \ell w$$
$$P = 2\ell + 2w$$



$$C = 2\pi r$$
$$A = \pi r^2$$



$$\sin\theta = \frac{a}{c} \qquad \cos\theta = \frac{b}{c} \qquad \tan\theta = \frac{a}{b}$$
$$\csc\theta = \frac{c}{a} \qquad \sec\theta = \frac{c}{b} \qquad \cot\theta = \frac{b}{a}$$