DAWSON COLLEGE
MATHEMATICS DEPARTMENT

FINAL EXAMINATION
Fall 2019

Remedial Activities for Secondary IV Mathematics
201-016-RE

Instructor: M. Beck, G. Chu

Student Name:

Student I.D.:

Date: December 11, 2019   Time: 9:30 – 12:30

Instructions:
- Print your name, student ID number and section in the space provided above.
- All questions are to be answered directly on the examination paper.
- Only calculators SHARP EL-531 are permitted.
- Please show all your work clearly.
- Please justify all your answers.
- Your answers must be exact and simplified unless otherwise stated.

All questions are equally weighted.
This exam must be returned intact.

1. Simplify $\dfrac{(3xy^3)^{-4}}{3x^{-6}y(x^{-5}y)^2}$ with positive exponents only.

2. Expand and simplify: $(7x+5)(x-11)-3(x+5)^2$.

3. Simplify $\dfrac{2x^2+9x+10}{x^2-4} \div \dfrac{x^2+5x}{(x+5)(x-2)}$.

4. Simplify $\dfrac{1-\dfrac{2}{x}}{3+\dfrac{1}{x}}$.

5. Rationalize the denominator and simplify the expression: $\dfrac{2 + 5\sqrt{3}}{1 - \sqrt{3}}$.

6. If $R = S(x + T)$, solve for x.

7. Cosmodome sells 76 tickets and collects $1458 on a certain occasion. If regular tickets cost $23 each and student tickets cost $13 each, how many of each were sold?

8. Solve for x: $x(x + 8) = 3$.

9. Solve for x: $\sqrt{1-x} - x = 5$.

10. Solve for x: $1 + \dfrac{3}{x-2} = \dfrac{12}{(x+2)(x-2)}$.

11. Solve for x: $9^{3x+7} = 243^{x-2}$.

12. Solve for x: $9^{3x+7} = 241$.

13. Solve for x: $7 + 4(1 - 3x) \geq x + 2(x - 3)$.

14. Suppose $(3\sqrt{2}, 2)$ and $(7\sqrt{2}, -2)$ are the endpoints of a diameter in a circle. Find the center and the radius of the circle.

15. Let $f(x) = \sqrt{3x-15}$ and $g(x) = x^2 + 13$.

    a. Find the domain of $f(x)$.

    b. Find $g(x+1) - f(8)$ and simplify.

16. Find an equation of the line if it passes through (7, -2) and is perpendicular to $2y + x - 2019 = 0$.

17. Find the intercepts and vertex of $f(x) = x^2 - 2x - 15$. Sketch and state its range.

y-intercept:_____

x-intercept(s):_____

Vertex:_____

Range:_____

18. A toy rocket is launched upward from a height of 3.075 meters and the height in meters, t seconds after it is launched is given by: $y = 3.075 + 1.96t - 0.4t^2$

    a. When does the rocket reach its maximum height and what is the maximum height?

    b. When will the rocket hit the ground?

19. Find the exact value of $\sec B - \cot A$ if $b = 12$, $c = 37$ and $C = 90°$ in triangle ABC.

20. a. A surveyor stands on a 30-feet high cliff directly above one bank of a river. From there, the angle of depression to the opposite bank is $23°$. How wide is the river? Correct your answer to 4 decimal places.

  b. Find the exact value of $\csc 45°\tan 60°$.

Answers:

1. $\dfrac{x^{12}}{243y^{15}}$

2. $4x^2 - 102x - 130$

3. $\dfrac{2x+5}{x}$

4. $\dfrac{x-2}{3x+1}$

5. $-\dfrac{17+7\sqrt{3}}{2}$

6. $x = \dfrac{R-ST}{S}$

7. 47 regular tickets and 29 student tickets

8. $x = -4 \pm \sqrt{19}$

9. $x = -3$

10. $x = -5$

11. $x = -24$

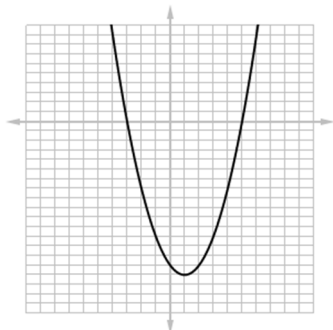12. $x = \dfrac{\log_9 241 - 7}{3}$

13. $x \le \dfrac{17}{15}$

14. Center = $(5\sqrt{2}, 0)$; Radius = $2\sqrt{3}$

15. a. $x \ge 5$ b. $x^2 + 2x + 11$

16. $y = -\dfrac{1}{2}x + \dfrac{3}{2}$

17.

y-intercept : $(0, -15)$

x-intercepts : $(-3,0), (5,0)$

Vertex : $(1, -16)$

Range : $y \ge -16$

18. a. 2.45 seconds; 5.476 meters   b. 6.15 seconds

19. $\dfrac{5}{7}$

20. a. 70.6756 feet   b. $\sqrt{6}$