DAWSON COLLEGE
MATHEMATICS DEPARTMENT
Remedial Activities Sec. IV - MATHEMATICS

I confirm that I have read and understood the College's Academic Integrity Document and will adhere to the principles of academic integrity while writing this exam.

201-016-RE S01-02
Fall 2024
Final Examination
December 16, 2024
Time Limit: 3 hours

Name: _____

ID#: _____

Instructors: A. Gambioli, S. Soltuz

- This exam contains 12 pages (including this cover page) and 20 problems. Check to see if any pages are missing.
- Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page, and please indicate that you have done so.
- Give the work in full; – unless otherwise stated, reduce each answer to its simplest, exact form; – and write and arrange your solutions in a legible and orderly manner.
- You are only permitted to use the **Sharp EL-531**** calculator.
- Good luck!

Question	Points	Score
1	5	
2	5	
3	5	
4	5	
5	5	
6	5	
7	5	
8	5	
9	5	
10	5	
11	5	
12	5	
13	5	
14	5	
15	5	
16	5	
17	5	
18	5	
19	5	
20	5	
Total:	100	

1. (5 marks) Simplify, expressing your answer in terms of positive exponents only.

$$\frac{(3x^4y^{-2})^2(xy^2)^{-1}}{9^{-1}x^{-3}y}.$$

Answer: $\frac{243x^{10}}{y^7}$

2. (5 marks) Expand and simplify:

$$(3x+1)(3x-1)-(3x+1)^2+2(x+1)$$

Answer: $-4x$

3. (5 marks) Express as a single fraction in simplest form:

$$\frac{x^2+14x+49}{2x^2-5x-3} \div \frac{x^2+10x+21}{x^2-9}$$

Answer: $\dfrac{x+7}{2x+1}$

4. (5 marks) Express as a single fraction in simplest form:

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

Answer: $\dfrac{x^2+3x-1}{(x-2)(x+2)}$

5. (5 marks) Rationalize the denominator and simplify completely:

$$\frac{8+\sqrt{2}}{8-\sqrt{2}}$$

Answer: $\frac{33+8\sqrt{2}}{31}$

6. (5 marks) Solve for x:

$$3x = 3(2x-5) - 5(3x-7)$$

Answer: $\frac{5}{3}$

7. (5 marks) A right triangle has the three sides of length: $a = x$ cm, $b = x + 7$ cm, $c = 13$ cm (where c is the hypoteneuse). Find x.

Answer: $x = 5$

8. (5 marks) The sum of a number with twice its reciprocal is $\frac{41}{12}$. Find that number.

Answer: $x = \frac{8}{3}$ $x = \frac{3}{4}$

9. (5 marks) Solve the linear system:

$$\begin{cases} 7x - 3y = 1 \\ 5x - 2y = -1 \end{cases}.$$

Answer:

$(x, y) = (-5, -12)$

10. (5 marks) Solve for x: $\sqrt{7-x} = 5 + x$

Answer: $x = -2$

11. (5 marks) Solve for x: $25^{x^2-1} = 125^{x+1}$

Answer: $x = -1$, $x = \frac{5}{2}$

12. (5 marks) Solve for x: $\log_{27}(x+1) = \frac{1}{3}$

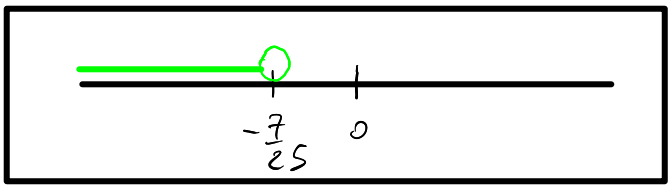
Answer: $x = 2$

13. (5 marks) Solve for x and express the solution set in in the form of an inequality, a graph and an interval: $5(x-2)+4(3-6x) > 2(3x-1)+11$.

Answer:

$x < -\frac{7}{25}$

$x \in (-\infty, -\frac{7}{25})$



14. (5 marks) Find the distance and the midpoint between the two points $A(11,-5)$ and $B(3,1)$.

Answer:

$(7,-2)$

15. Consider the functions $f(x) = \sqrt{2x+10}$ and $g(x) = x^2 - 5x + 8$.

(a) (2 marks) Find the domain of $f(x)$.

Answer: $D(f) = [-5, +\infty)$

(b) (3 marks) Evaluate $2f(3) + 3g(2)$.

Answer: 14

16. (5 marks) Find the equation of the line that is parallel to the line $6x + 3y - 4 = 0$ and that passes through the point $A(2,3)$.

Answer: $y = -2x + 7$

17. (5 marks) Find all the values of x so that $(x,-3)$ is at a distance of 5 units from $(12,0)$.

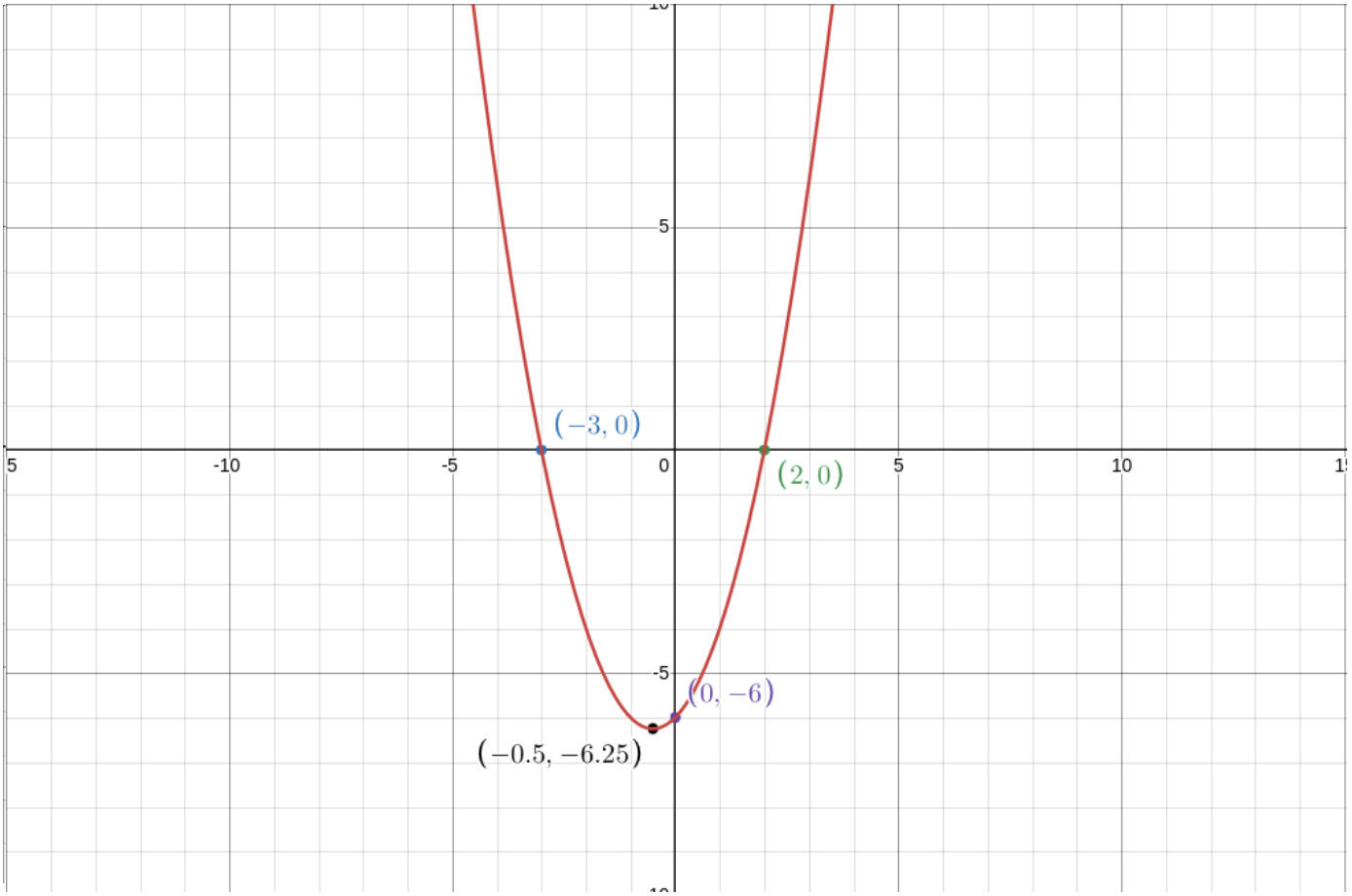
Answer:

$x = 16$

$x = 8$

18. (5 marks) Find the intercepts, the vertex and the range of $f(x) = x^2 + x - 6$, then sketch its graph.

Answer:

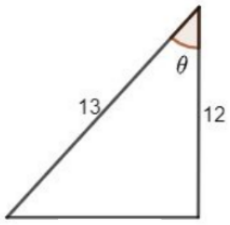


19. (5 marks) A ball is kicked vertically and its height is given by $h(t) = 12t - 2t^2$, where h is measured in meters and $t \geq 0$ in seconds. Find the time at which the ball reaches the maximal height and the value of the maximal height.

Answer: 3 Sec (Time of Max height)

Answer: 18 m (MAX height)

20. (5 marks) Find the exact value of $\cos\theta + \sin\theta + \tan\theta$.



Answer: $\frac{259}{156}$