MATH 1050 FINAL EXAM – WINTER 2019

SHOW ALL WORK. DO NOT USE A CALCULATOR.

Each problem is worth 8 points.

1. Simplify by adding (or subtracting) like terms wherever possible:

$$3\sqrt{x^2 + 3} + 5xy + 4x - 7\sqrt{x^2 + 3} - \pi x + 8^x + 8^x$$

2. Simplify completely:

$$\left(\frac{3x^3 y^0 z^{-5}}{x^{-3} y^4 z^2}\right)^{-2} (x^3 y^{-1} z)$$

3. Simplify completely:

$$\left(\sqrt{20} + \sqrt{10}\right)^2$$

4. Solve:
$$10 - 2|3x + 2| \geq 4$$

5. Simplify completely:

$$\frac{27^{-\frac{1}{3}} - 4^{-\frac{3}{2}}}{27^{-\frac{1}{3}} + 4^0}$$

6. Noor took three final exams: algebra, biology, and chemistry. In the week before the exams, she studied for a total of 52 hours. She studied twice as long for chemistry as she did for algebra. She studied four hours more for biology than she did algebra. How much did she study for each exam?

7. Solve for c:
$$1 - \frac{a}{c} = \frac{ac - 1}{bc}$$

8. Let f be the function given by
$$f(x) = \frac{x - 8}{x^2 + 2x - 8}$$

    What is the domain of f?

9. Let g be the function given by

$$g(x) = \frac{|1 - x^2|}{2 + \sqrt{x - 3}}$$

    Find and simplify: $g(7) - 2 \cdot g(4)$

10. Let f be the function given by $f(x) = x^2 - 3x$

    Find and simplify: $\dfrac{f(x+h) - f(x)}{h}$

11. Find the equation of the line that is perpendicular to the line $5x + 3y = 1$ and passes through the point $(5,2)$.

12. Divide: $(x^3 + 4x^2 + x - 6) \div (x + 2)$

13. Solve, writing any non-real solutions in the form a+bi: $x^2 + 6 = 2x$

14. Let $f(x) = 3x^2 - 6x - 9$. Graph f, labeling the vertex and all intercepts.

15. Simplify completely:

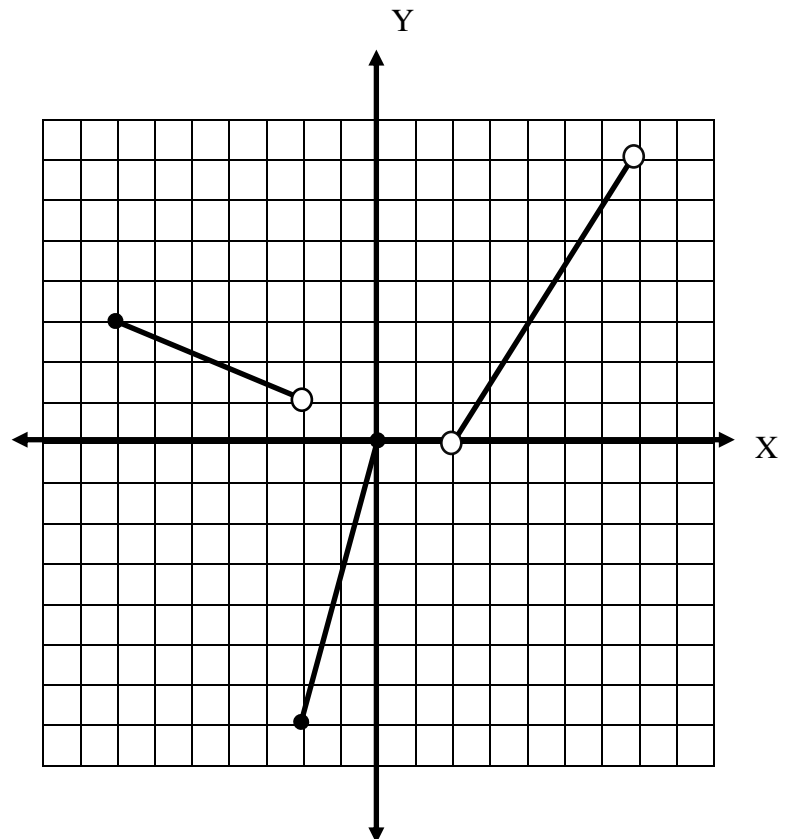$$\frac{\dfrac{1}{x} - 7}{14 - \dfrac{2}{x}}$$

16. Let $f(x) = 2x - \sqrt{x + 3}$. Find all x such that $f(x) = 0$.

17. Solve:

$$\frac{t^2}{t-2} > 0$$

18. The graph a function, f, is shown here.

    a) What is the domain of f?
    b) What is the range of f?
    c) What is $f(-2)$?
    d) Find all x such that $f(x) = 3$

19. Solve: $x^6 - 9x^3 + 8 = 0$

20. Find:

   a) $\log_5\left(\frac{1}{25}\right)$ b) $\log_3(81)$ c) $\log_8(2)$ d) $\log_{16}\left(\frac{1}{2}\right)$

21. Solve: $\log_3(x+4) + \log_3(x-4) = 2$

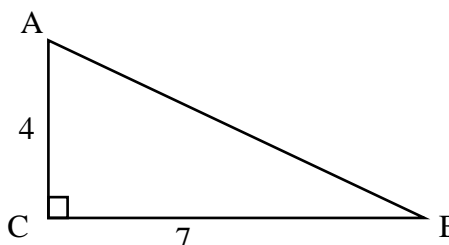22. Arrange the following numbers in order, with the smallest on the left:

$$\sin(-3), \log_2 5, \cos(\pi), \cos(-1)$$

23. Convert: a) $18\pi°$ to radians
                      b) 10π radians to degrees

24. For the right triangle shown here, find:

   a) $\tan(\angle A)$

   b) $\cos(\angle B)$

25. Matt walks three miles to his friend's house and borrows a bike to ride home. He averages four miles per hour faster when riding than he did walking. If the total time for the entire roundtrip was two hours, what is Matt's walking speed?