FCE Version 2C – MA103   100 points

GENERAL INSTRUCTIONS: Read all instructions carefully.

1. You have 55 minutes to complete the Fundamental Concepts Exam (FCE).

2. This exam evaluates your understanding of fundamental pre-calculus skills. This is a non-technology exam. There are no references allowed during this exam.

3. Including this cover page and the answer sheet, there are seven pages to the exam.

4. Write your name on every exam page.

5. This exam is a multiple choice exam. Ensure you clearly and fully indicate your answer on the answer sheet (page 7 of the exam). If more than one answer is selected, the problem will be marked incorrect. If you change your answer, be sure to erase your original answer completely or make it very clear as to which answer you believe is the correct one.

6. Should you require additional space, use a blank sheet of paper. You are required to staple any continuation sheets to your exam prior to leaving.

7. There are a total of 25 questions with each question worth 4 points.

8. Early departure is authorized. Make sure you comply with exam turn-in requirements as outlined by your instructor.

Question	Score	Question	Score	Question	Score
1		10		18	
2		11		19	
3		12		20	
4		13		21	
5		14		22	
6		15		23	
7		16		24	
8		17		25	
9					

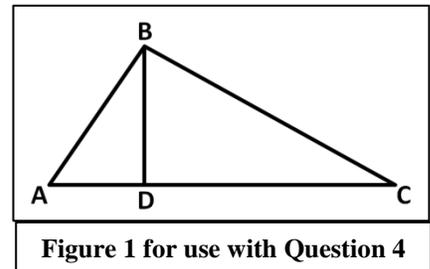| Total Score	

1. Which of the following values does not represent the same angle?
   a. $570°$
   b. $210°$
   c. $\frac{2\pi}{3}$ radians
   d. $\frac{7\pi}{6}$ radians

2. What are the roots of the function $(s) = 2s^2 + 4s - 6$?
   a. -1 and 3
   b. -2 and 3
   c. -3 and 1
   d. -3 and 2

3. What values of v satisfy $2v^2 + 12v + 24 < v^2 + 2v$?
   a. $v < -12$ and $v > -2$
   b. $-12 < v < -2$
   c. $v < -6$ and $v > -4$
   d. $-6 < v < -4$

4. Using Figure 1, determine the length of $\overline{AD}$ given that $\overline{DC}$ is 12 inches long, $\overline{BD}$ is 6 inches long and the area of the triangle ABC is 45 in^2?
   a. 6 in
   b. 3 in
   c. 4 in
   d. 8 in

Figure 1 for use with Question 4

5. Given $y = \log_3 x$, find x when $y = 5$.
   a. $x = 25$
   b. $x = 27$
   c. $x = 125$
   d. $x = 243$

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6. On a 100 mile road trip, you drive the first 30 miles at 40 mph. How long does the entire trip take if you are traveling 50 mph the rest of the way?
   a. 107 minutes
   b. 159 minutes
   c. 121 minutes
   d. 129 minutes

7. Determine the equation of the line parallel to the line $y = \frac{x}{3} + 5$ that goes through the point $(1, -3)$?
   a. $y = \frac{1}{3}x - \frac{10}{3}$
   b. $y = 3x$
   c. $y = -\frac{1}{3}x + \frac{10}{3}$
   d. $y = -3x + 4$

8. Determine which function is displayed in Figure 2.
   a. $f(k) = (k^2 - 4k - 5)(k - 4)$
   b. $f(k) = (k^2 - 4k + 4)(k - 5)$
   c. $f(k) = (k^2 + k - 2)(k - 5)$
   d. $f(k) = (k^2 - 4k - 4)(5 - k)$

Figure 2 for use with Question 8
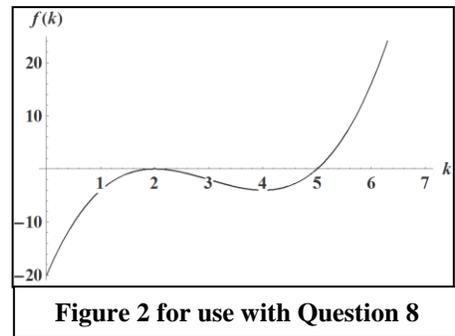
9. What is the range of $(x) = \frac{1}{2-x}$?
   a. All Real Numbers
   b. All Real Numbers except $x \neq 2$
   c. $0 < f(x) < \infty$
   d. $-\infty < f(x) < 0 \cup 0 < f(x) < \infty$

10. Given that $g(u) = u^2 + u$ and $h(v) = v + 2$, find $g(s + 1) - h(s - 1)$.
    a. $s^2 + 2s + 1$
    b. $s^2 + 2s + 2$
    c. $s^2 + s$
    d. $s^2 + s + 4$

11. Simplify the following expression: $\frac{36x^{10}y^8z^{12}}{24x^{16}y^5z^4}$.

   a. $\frac{3x^6}{2y^3z^8}$

   b. $\frac{6y^3z^6}{5x^8}$

   c. $\frac{3y^3z^8}{2x^6}$

   d. $\frac{6y^3z^8}{5x^6}$

12. What is the distance between the points $(-7,2)$ and $(-1,5)$?

   a. 8

   b. $\sqrt{45}$

   c. $\sqrt{104}$

   d. 9

13. Two cadets depart West Point at the same time. The first runs west at 3 mph and the second runs south at $2\frac{1}{4}$ mph. What is the straight line distance between them after four hours?

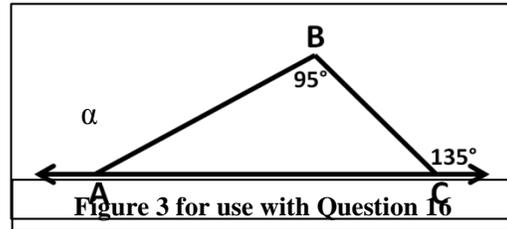   a. 15 miles

   b. 12 miles

   c. 11 miles

   d. 9 miles

14. Where do the following functions intersect: $\begin{array}{l} y = -2x + 4 \\ y = x^2 + 4 \end{array}$?

   a. $(-2,8)$ and $(4, -4)$

   b. $(2,0)$ and $(0,4)$

   c. $(-2,8)$ and $(0,4)$

   d. $(-4,12)$ and $(-2,8)$

15. What is the domain of the real valued function $f(s) = \frac{4-s}{\sqrt{2-s}}$?

   a. All Real Numbers

   b. $s < 2$

   c. $-2 < s < 2$

   d. $s > -2$

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16. Using Figure 3, what is the value of α?

    a. 40°
    b. 85°
    c. 140°
    d. 135°

Figure 3 for use with Question 16

17. What is the volume of a cube whose side has a length of 4 inches?

    a. $64\ in^3$
    b. $36\ in^3$
    c. $16\ in^3$
    d. $12\ in^3$

18. Solve the following system of quadratic equations for x and y: $\begin{aligned} y &= x^2 - 2 \\ y &= 2x^2 - 3 \end{aligned}$

    a. $(-3,7)$ and $(3,7)$
    b. $(-1,-1)$ and $(1,-1)$
    c. $(-2,2)$ and $(2,2)$
    d. $(0,-2)$ and $(1,-1)$

19. Express -1213.354 in scientific notation.

    a. -12.13×10^2
    b. -1.213×10^{-3}
    c. -1.213×10^3
    d. -12.13×10^{-2}

20. Solve the following for all values of s that satisfy $(2s + 3)(s - 1) = s - s^2$.

    a. -3 and 3
    b. -1 and 1
    c. -3 and 1
    d. -1 and 3

21. Solve $\left|\frac{x+3}{4}\right| > 3$ for x.

    a. $-9 < x$ or $x > 15$
    b. $-\frac{9}{4} < x$ or $x > \frac{9}{4}$
    c. $-15 > x$ or $x > 9$
    d. $-15 < x < 9$

22. Where does the graph of the function $f(x) = x^2 + 2x - 5$ cross the x-axis?
    a. $x = -5 \; and \; 1$
    b. $x = -1 \; and \; 5$
    c. $x = -\frac{5}{2} \; and \; 1$
    d. $x = \frac{-2 \pm \sqrt{24}}{2}$
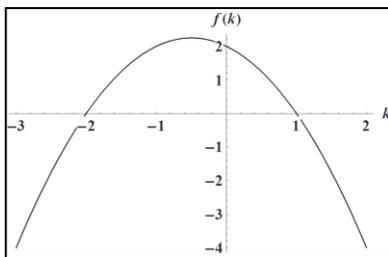
23. Evaluate $\ln e + \log_5 125$
    a. 3
    b. $e + 3$
    c. 4
    d. $e + 4$

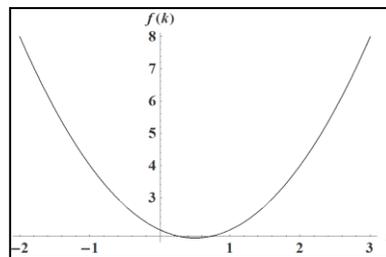24. What is the equation of a line that goes through the points (-3,5) and (2,7)?
    a. $y = \frac{2}{5}x + \frac{31}{5}$
    b. $y = 2x - 13$
    c. $y = \frac{1}{2}x + 6$
    d. $y = \frac{2}{5}x - 5$

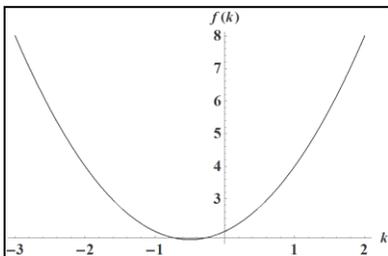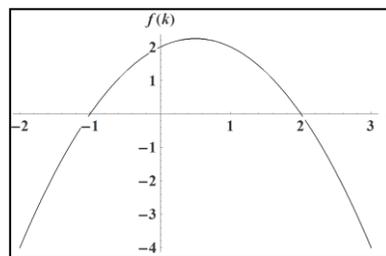25. Which of the following graphs represents $f(w) = -w^2 + w + 2$.
    a.
    b.

    c.
    d.

Cadet _____

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1. (A) (B) ● (D)

2. (A) (B) ● (D)

3. (A) (B) (C) ●

4. (A) ● (C) (D)

5. (A) (B) (C) ●

6. (A) (B) (C) ●

7. ● (B) (C) (D)

8. (A) ● (C) (D)

9. (A) (B) (C) ●

10. ● (B) (C) (D)

11. (A) (B) ● (D)

12. (A) ● (C) (D)

13. ● (B) (C) (D)

14. (A) (B) ● (D)

15. (A) ● (C) (D)

16. (A) (B) ● (D)

17. ● (B) (C) (D)

18. (A) ● (C) (D)

19. (A) (B) ● (D)

20. (A) ● (C) (D)

21. (A) (B) ● (D)

22. (A) (B) (C) ●

23. (A) (B) ● (D)

24. ● (B) (C) (D)

25. (A) (B) (C) ●