

Off-Copy T02

King Fahd University of Petroleum and Minerals
College of Sciences, Prep-Year Math Program

Code 003

Math 002, Final Exam
Term (002)
Sunday, May 27, 2001
Time Allowed: 2 Hrs. 15 Min.

Code 003

STUDENT NAME: _____

ID #: _____ SECTION #: _____

Important Instructions

Use only 6 Digits I.D. # : i.e. Remove two zeros from 2000 of your ID#
(Example: ID# 20006587 should be bubbled as 206587)

Do not put any mark on a choice of any answer on the Exam Paper

**Looking around or making an attempt of cheating may cause
you expulsion from the Place of Exam.**

1. Use an HB 2.5 pencil. Any mistake in bubbling your ID number will cost you one grade point.
2. Use a good eraser. Do not use the eraser attached to the pencil.
3. Write your name, ID number and Mathematics Section number on the examination paper
4. When bubbling your ID number and Math Section number, be sure that bubbles match with the number that you write.
5. Match the test Code Number already bubbled in your answer sheet with the Test Code Number printed on your question paper.
6. When erasing a bubble, make sure that you do not leave any trace of pencilling.
7. Check that the exam paper has 26 questions.

page 1

CODE 003

1. The wheels on a truck turn at the rate of K revolutions per second when the truck is travelling at 60 feet per second. If the diameter of the wheels is 3 feet, what is the value of K ?

- (a) $20/\pi$
- (b) $30/\pi$
- (c) $6/\pi$
- (d) $54/\pi$
- (e) 3π

2. If the terminal side of the angle θ lies on the line

$$3x + 4y = 0 \quad \text{and} \quad x < 0$$

then the value of

$$\sin \theta + \cos \theta + \tan \theta$$

is equal to

- (a) $\frac{13}{20}$
- (b) $\frac{19}{15}$
- (c) $-\frac{19}{20}$
- (d) $\frac{43}{20}$
- (e) $\frac{13}{20}$

page 2

CODE 003

3. The exact value of

$$\cos\left(\frac{11\pi}{6}\right) - 4\sin\left(\frac{20\pi}{3}\right)$$

is equal to

- (a) $\frac{\sqrt{3}}{2} + 2$
- (b) $-\frac{\sqrt{3}}{2}$
- (c) $\frac{1 + 4\sqrt{3}}{2}$
- (d) $-2 + \frac{\sqrt{3}}{2}$
- (e) $-\frac{3\sqrt{3}}{2}$

4. The solution set of

$$2\log(x - 2) = \log(\log 10^x) + 10^{\log(\log x)}$$

- (a) contains exactly one integer
- (b) contains exactly two integers
- (c) contains exactly one integer and one irrational number
- (d) is empty
- (e) contains only irrational numbers

CODE 003

5. The period of the function $\sqrt{\sin^2(2x)}$ is

- (a) $\frac{\pi}{2}$
- (b) π
- (c) π^2
- (d) $4\pi^2$
- (e) 2π

6. A man stands 10 feet from a tree and measures the angle of elevation to the top of the tree as 60° . He moves back from the tree until the angle becomes 30° . How far did he move back?

- (a) 30 feet
- (b) 20 feet
- (c) $10\sqrt{3}$ feet
- (d) $20\sqrt{3}$ feet
- (e) 50 feet

CODE 003

7. Which of the following is **TRUE** for square matrices A and B which are the same size?

- (a) If $AB = 0$ then $A = 0$ or $B = 0$
- (b) $(A + B)^2 = A^2 + 2AB + B^2$
- (c) $(A - B)(A + B) = A^2 - B^2$
- (d) $(AB)^{-1} = B^{-1}A^{-1}$
- (e) $A(BC) = (BA)C$

8. What is the value of the determinant

$$\begin{vmatrix} 4 & -1 & 3 \\ 3 & 1 & 2 \\ 1 & -1 & 1 \end{vmatrix} ?$$

- (a) -1
- (b) 1
- (c) 2
- (d) -2
- (e) -15

page 5

CODE 003

9. If $\cos \alpha = \cos \beta = 1/2$, then the value of

$\cos(\alpha + \beta) \cos(\alpha - \beta)$ is

- (a) $\frac{1}{2}$
- (b) 1
- (c) -1
- (d) $-\frac{1}{2}$
- (e) 0

10. The solution of the following equation

$$\arcsin(x) + \arcsin\left(-\frac{20}{29}\right) = \arcsin\left(\frac{21}{29}\right)$$

is $x =$

- (a) -1
- (b) 0
- (c) 1
- (d) $\frac{21}{29}$
- (e) $-\frac{21}{29}$

CODE 003

11. If $0 \leq x < 2\pi$, then the sum of all solutions of

$$2 \sin x - 1 - \csc x = 0$$

is equal to

- (a) $\frac{\pi}{2}$
- (b) 3π
- (c) $\frac{5\pi}{3}$
- (d) 0
- (e) $\frac{7\pi}{2}$

12. If the amplitude of the function

$$f(x) = \sqrt{3} \sin(2x) + 2 \cos(2x)$$

is A and the period is B , then

$$\frac{A^2}{\pi} B$$

is equal to

- (a) 5
- (b) $2\sqrt{7}$
- (c) $\sqrt{7}$
- (d) 10
- (e) 7

page 7

CODE 003

13. If

$$\vec{u} = \langle 2\sqrt{3}, -3 \rangle \quad \text{and} \quad \vec{v} = \langle -\sqrt{3}, 4 \rangle$$

then the magnitude and direction angle of $\vec{u} + \vec{v}$ are equal to

- (a) $2, \pi/3$
 - (b) $\sqrt{3}, \pi/3$
 - (c) $2, \pi/6$
 - (d) $\sqrt{3}, \pi$
 - (e) $4, \pi/6$
14. The range and period of the function $f(x) = 2 + 3/2 \csc(x/3 - \pi/2)$ are
- (a) $(-\infty, -1] \cup [5, \infty)$ and 6π
 - (b) $[1/2, 7/2]$ and 3π
 - (c) $(-\infty, 1/2] \cup [7/2, \infty)$ and 6π
 - (d) $(-\infty, 1/2] \cup [7/2, \infty)$ and $2\pi/3$
 - (e) $(-\infty, -1] \cup [5, \infty)$ and $2\pi/3$

page 8

CODE 003

15. The system

$$\begin{aligned}u + 2v &= 1 \\ 2u + a^2v &= a\end{aligned}$$

has exactly one solution if

- (a) $a = 2$ and $a \neq -2$
- (b) $a \neq 2$
- (c) $a = -2$ and $a \neq 2$
- (d) $a \neq 2$ and $a \neq -2$
- (e) $a \neq -2$

16. If

$$A = \begin{pmatrix} 1 & 2 & -1 \\ 1 & 0 & 1 \\ -1 & 1 & 1 \end{pmatrix}$$

then what is the element in row 2 column 3 of A^{-1} ?

- (a) 0
- (b) $\frac{1}{3}$
- (c) $-\frac{1}{3}$
- (d) 3
- (e) 1

page 9

CODE 003

17. If the parabola

$$y = ax^2 + bx + c$$

contains the points

$$(0, 1) \quad (1, 4) \quad (-1, 2),$$

then the sum $a + b + c$ is equal to

- (a) 5
- (b) 4
- (c) 1
- (d) -1
- (e) 6

18. If

$$M = \begin{pmatrix} 5 & 6 \\ 4 & 0 \end{pmatrix}$$

and I is the 2×2 identity matrix, then the sum of the values of x which satisfy

$$\det(M - xI) = 0$$

is

- (a) 5
- (b) -5
- (c) 10
- (d) -3
- (e) -10

page 10

CODE 003

19.

$$f(x) = \frac{ax^2 + 2x - 4}{x^2 - b}$$

If $x = -1$ and $y = 2$ are vertical and horizontal asymptotes of $f(x)$, then the graph has a hole or missing point at

- (a) $(-1, 0)$
- (b) $(1, 0)$
- (c) $(-2, 1)$
- (d) $(3, 1)$
- (e) $(1, 3)$

20. If $2 - i$ is a zero with multiplicity two of

$$p(x) = x^5 - 9x^4 + 34x^3 - 66x^2 + 65x - 25$$

then the sum of the non real zeros is

- (a) -9
- (b) 8
- (c) $8 - 4i$
- (d) $8 + 4i$
- (e) $4i$

page 11

CODE 003

21. The sum of the real zeros of

$$6x^4 - x^3 + 5x^2 - x - 1$$

is

(a) 0

(b) $\frac{1}{6}$

(c) 1

(d) $-\frac{1}{6}$

(e) $\frac{5}{6}$

22.

If $y^{1/3} = \log_{10} 100$,

then y is equal to

(a) 2

(b) -2

(c) 10

(d) -8

(e) 100

page 12

CODE 003

23. The graph of the polynomial

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

is above the x axis on

- (a) $(-\infty, 1) \cup (1, 2)$
- (b) $(1, 2)$
- (c) $(-\infty, 2)$
- (d) $(-\infty, -1) \cup (1, 2)$
- (e) $(2, \infty)$

24. If a population grows according to the formula

$$A(t) = 2^{3/4} 2^{0.25t}$$

where $A(t)$ is the amount after t years, then the number of years it takes for the population to double is

- (a) 4
- (b) $\frac{4}{3}$
- (c) 1
- (d) 25
- (e) 100

CODE 003

25. If Z is a 5×5 matrix and $|Z| = 3$, then $|2Z^{-1}|$ is equal to

- (a) $\frac{25}{3}$
- (b) 50
- (c) 10
- (d) $\frac{64}{9}$
- (e) $\frac{32}{3}$

26. Mr. X and Mr. Y start doing their homework problems at the same time. Mr. X will finish 9 hours before Mr. Y.

Mr. X is twice as fast as Mr. Y. How long will it take them to finish the homework if they do the problems together?

- (a) 2 hours
- (b) 4 hours
- (c) 6 hours
- (d) 8 hours
- (e) 10 hours