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

Master	Math 002 Final Exam Term 023 Thursday, August 21, 2003 Time Allowed: 2-1/2 hours	Master
Student's Name:	KEY SOLUTI	ONS
ID #:	Section #:	

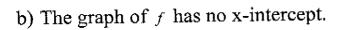
Important Instructions:

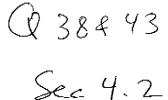
- 1. All types of Calculators, Pagers or Telephone are NOT allowed during the examination.
- 2. DO NOT any mark on a choice of any answer on the exam paper.
- 3. Use HB 2.5 pencils only.
- 4. Use a good eraser. DO NOT use the erasers attached to the pencil.
- 5. Write your name, ID number and Math Section number on both the examination paper and the OMR sheet.
- 6. Detach the OMR sheet carefully.
- 7. When bubbling your ID number and Math Section number, be sure that the bubbles match with the number that your write.
- 8. Math the Test Code Number already bubbled in your answer sheet with the Test Code Number printed on your question paper.
- 9. When erasing a bubble, make sure that you do not leave any trace of penciling.
- 10. Check that the exam paper has 30 questions.

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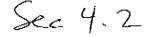
Master

- 1. Let $f(x) = e^{-x} + 1$, then which one of the following statements is FALSE?
- a) The range of f is $(0,\infty)$.

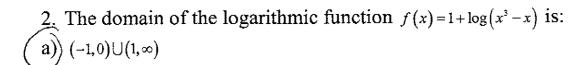




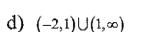
c) The graph of f has a y-intercept at (0,2).



- d) The graph of f decreases on the interval $(-\infty,\infty)$.
- e) The domain of f is $(-\infty, \infty)$.



- b) $(-1,1) \cup (1,\infty)$
- c) $(-1,\infty)$



e) $(-2,0) \cup (2,\infty)$



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3. The number of real solutions of the exponential equation $\frac{10^x - 10^{-x}}{2} = 20 \text{ is:}$



b) 0

)39 Sec 4.5

- c) 2
- d) 3
- e) 4

4. Which one of the following statements is TRUE?

- a) \$40° and 400° are coterminal angles.
- b) Angles that have a measure greater than 90° but less than 180° are acute angles.
- c) 90° angles are straight angles.

General Statements from Sec S. 1

d) π radian = π °

e) π radian is less than π °

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5. If
$$W\left(\frac{-17\pi}{6}\right) = P(x,y)$$
, then $x - y = -10$

- - b) $\frac{-\sqrt{3}-1}{2}$
 - c) 0
 - d) $\frac{\sqrt{3}-1}{2}$
 - e) $\frac{\sqrt{3}+1}{2}$
 - 6. Let $\frac{\pi}{2} < t < \pi$. By writing $\tan t$ in terms of $\sin t$, we get:

$$(a) \tan t = \frac{-\sin t}{\sqrt{1-\sin^2 t}}$$

- b) $\tan t = \frac{\sin t}{\sqrt{1-\sin^2 t}}$
- c) $\tan t = \frac{\sin t}{\sqrt{1 + \sin^2 t}}$
- d) $\tan t = \frac{-\sin t}{\sqrt{1+\sin^2 t}}$
- $e) \tan t = \frac{-\sqrt{1-\sin^2 t}}{\sin t}$

Similar to @1-12 Sec 5.4

Similian to \$765-68

Sec 5.4

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- 7. Let $f(x) = 1 + \csc\left(2x + \frac{\pi}{6}\right)$. Then which one of the following statements is TRUE?
- a) The graph of f has infinitely many x-intercepts.
 - b) The phase shift of f is $\frac{-\pi}{6}$.

Similiar to @ 33-50 Sec S.7

c) The period of f is 2π .

- d) The graph of f has no x-intercept.
- e) One cycle of the graph of f is completed on the interval $\frac{-\pi}{6} \le x \le \frac{\pi}{6}$.
- 8. $\frac{\sin 3x}{\sin 2x} + \frac{\cos 3x}{\cos 2x} =$
- - b) $\frac{5}{2}$
- $d) \, \frac{\sin 6x}{\sin 4x}$

 $c) \, \frac{\sin 5x}{\sin 4x}$

e) 3

Similiar to Exy Sec 6. 2 & Exl Sec 6.3

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9. $\cos^2 112.5^\circ =$



 $b) \ \frac{2+\sqrt{2}}{4}$

Similiar to Q14 Sec 6.3

- c) $\frac{-2-\sqrt{2}}{4}$
- d) $\frac{-2+\sqrt{2}}{4}$
- e) 1

10. The sum of the solutions of the trigonometric equation $\sqrt{3}\sin x + \cos x = 1$, where $\pi < x < 3\pi$, is:



 $b) 4\pi$

54 Sec 6.6

- c) $\frac{10\pi}{3}$
- $d) \frac{8\pi}{3}$
- $e) \frac{18\pi}{3}$

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- 11. The solution set of the inverse trigonometric equation $\sin^{-1}\frac{-3}{5} + \tan^{-1}x = \frac{\pi}{2}$ is:
- - b) $\frac{4}{3}$

 $c)\frac{4}{5}$

Similian to EXS

- $d) -\frac{4}{5}$
- e) 1
- 12. If $u = \langle 3,3 \rangle$ and v = 3j, then a vector of length 3 in the opposite direction of $u + \frac{1}{3}v$ is:

$$\underbrace{a}, \underbrace{\frac{-9}{5}, \frac{-12}{5}}$$

b) $\left\langle \frac{9}{5}, \frac{-12}{5} \right\rangle$

c) $\left\langle \frac{-9}{5}, \frac{12}{5} \right\rangle$

d) $\left\langle \frac{-3}{5}, \frac{-12}{5} \right\rangle$

(e) $\left\langle \frac{-9}{5}, \frac{-4}{5} \right\rangle$

Similian to Ex 34 4
Sec 7.3

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- 13. Given the vectors $w = \langle y, x \rangle$ and $v = \langle x, y \rangle$, then $proj_w v + proj_v w$ is equal to:

Similiar to Ex 10

- $c) \ \frac{2xy}{\|y+w\|}$
- $d) \| w \|$
- e) $2(x^2 + y^2)$
- 14. The equation in standard form of the parabola that has vertex (3,-5), has its axis of symmetry parallel to the x-axis and passes through the point (4,3) is:
- (a) $(y+5)^2 = 64(x-3)$
- b) $(y+5)^2 = -16(x-3)$

Q34 Sec. 8.1

- c) $(y+5)^2 = 16(x-3)$
- d) $(x-3)^2 = 64(y+5)$
- e) $(x-3)^2 = 16(y+5)$

- 15. The coordinates of one of the foci of the ellipse that has eccentricity $\frac{2}{3}$, minor axis of length $2\sqrt{20}$ on the x-axis and center at (0,0) is:
- a) (0,4)
 - b) (-4,0)

Similiar to QS1

c) (0,-8)

Sec 8 · 2

- d) (0,-6)
- e) (2,0)
- 16. One equation of the asymptotes of the hyperbola $4x^2 - 25y^2 + 16x + 50y - 109 = 0$ is:
- $(a)) y = \frac{2}{5}x + \frac{9}{5}$
 - b) $y = \frac{2}{5}x + 1$

124 Sec 8.3

- c) $y = \frac{-2}{5}x \frac{9}{5}$
- d) $y = \frac{2}{5}x + 9$
- e) $y = \frac{-2}{5}x + 1$

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17. The equation in standard form of the hyperbola that has foci (0,3) and (0,-3) and passes through the point $\left(\frac{5}{2},3\right)$ is:

$$(a) \frac{v^2}{4} - \frac{x^2}{5} = 1$$

b)
$$\frac{y^2}{8} - \frac{x^2}{5} = 1$$

c)
$$\frac{y^2}{4} - \frac{x^2}{10} = 1$$

$$d) \frac{x^2}{16} - \frac{y^2}{25} = 1$$

e)
$$\frac{x^2}{4} - \frac{y^2}{5} = 1$$

18. If (x, y) is the solution of the system of equations $\begin{cases} 2x - 5\pi y = 3 \\ 3x + 4\pi y = 2 \end{cases}$, then $x + \pi y =$

$$a)\frac{17}{23}$$

b) $\frac{15}{23}$

Q38 Sec 9-1

c) 1

$$d)\ \frac{13}{23}$$

e) $\frac{19}{23}$

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19. If the graphs of the parabola $y = x^2 - 4x + 3$ and the line y-2x=k intersect at only one point, then the value of k is equal to:

- - b) 6

Similiar to 035 Sec 9-3

c) 3

- d) -3
- e)-1

20. If (a,b) and (c,d) are the solutions of the system $\begin{cases} (x-1)^2 + (y+1)^2 = 5 \\ (x+1)^2 + (y-1)^2 = 1 \end{cases}$, then a+b+c+d is equal to:

- - b) -2

Similian to (03) Sec 9.3

c) 2

- d) -1
- e) 1

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21. The echelon form of the system $\begin{cases} 4x - 5y - z = 2 \\ 3x - 4y + z = -2 \text{ is:} \\ x - 2y - z = 3 \end{cases}$

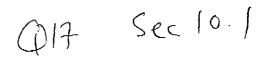
a)
$$\begin{bmatrix} 1 & -2 & -1 & 3 \\ 0 & 1 & 2 & -\frac{11}{2} \\ 0 & 0 & 1 & -\frac{13}{6} \end{bmatrix}$$
b)
$$\begin{bmatrix} 1 & -2 & -1 & 3 \\ 0 & 1 & 2 & -11 \\ 0 & 0 & 1 & -\frac{13}{6} \end{bmatrix}$$
c)
$$\begin{bmatrix} 1 & -2 & -1 & 3 \\ 0 & 1 & 2 & -\frac{11}{2} \\ 0 & 0 & 0 & -\frac{13}{6} \end{bmatrix}$$
d)
$$\begin{bmatrix} 1 & -2 & -1 & 3 \\ 0 & 1 & 2 & -\frac{11}{2} \\ 0 & 0 & 1 & -\frac{5}{6} \end{bmatrix}$$
e)
$$\begin{bmatrix} 1 & -2 & -1 & 3 \\ 0 & 1 & 2 & -\frac{11}{2} \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Q7 Sec 10.1

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- 22. The system of equations $\begin{cases} x+2y-2z=3\\ 5x+8y-6z=14\\ 3x+4y-2z=8 \end{cases}$
- a) is dependent
 - b) is independent
 - c) is inconsistent



- d) has the unique solution $\left\{ \left(2, \frac{1}{2}, 0 \right) \right\}$
- e) has the unique solution $\left\{ \left(0, \frac{5}{2}, 1\right) \right\}$
- 23. The system $\begin{cases} x+y=1\\ y+z=1\\ x+kz=1 \end{cases}$ has no solution if k is equal to:



b) 1

c) 0

- d) -2
- e) 2

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24. If $A = \begin{bmatrix} 1 & x \\ 2 & 3 \end{bmatrix}$ and $A^2 - 4A = I$, then x is equal to:

- a) 🕽
 - *b*) 1

Similian to 629 & Ex1

Sec 10.2

- c) 0
- d)-1
- e) -2
- 25. The matrix $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 3 & 1 \\ 0 & k & 2 \end{bmatrix}$ is a **singular matrix** if k is equal to:
- (a) **)**6
 - b) 6
 - c) -2
 - d)-3
 - e) 3

Ex 2 Sec 10-3 with Aldoes not exist if |A| = 0

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26. The system of equations $\begin{cases} 3x - 5y = -18 \\ 2x - 3y = -9 \end{cases}$, has the solution in the form:

$$\begin{array}{c}
 \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -3 & 5 \\ -2 & 3 \end{bmatrix} \begin{bmatrix} -18 \\ -9 \end{bmatrix}$$

$$b) \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 & -5 \\ 2 & -3 \end{bmatrix} \begin{bmatrix} -18 \\ -9 \end{bmatrix}$$

$$c) \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 3 & 5 \\ 2 & 3 \end{bmatrix} \begin{bmatrix} -18 \\ -9 \end{bmatrix}$$

$$d \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -18 \\ -9 \end{bmatrix} \begin{bmatrix} -3 & 5 \\ -2 & 3 \end{bmatrix}$$

$$e)\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -5 & 3 \\ -3 & 2 \end{bmatrix} \begin{bmatrix} -18 \\ -9 \end{bmatrix}$$

27. Let $A^{-1} = \begin{bmatrix} 1 & 0 & 7 \\ 2 & 1 & -1 \\ 7 & 3 & 1 \end{bmatrix}$, then the sum of the elements in the 2nd row of the matrix A is:

b) 10

Ex 3

Sec (0.3

- c) 9
- d) 16
- e) 2

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- 28. If $A = \begin{bmatrix} 5 & -2 & -3 \\ 2 & 4 & -1 \\ 4 & -5 & 6 \end{bmatrix}$, then $M_{21} + C_{23} =$
- (a) -10
 - b) -18
- Q9-12
- Sec 10. 4

- c) 8
- d) 9
- e) 0
- 29. Let A, B be two invertible matrices such that |A| = 2 and |B| = 4, then $|2A| + |A^{-1}B| =$
- a) 18

b) 10

Elementary Row Operations & Product & Inverse Property

c) 20

d) 22

Sec 10-4

e) 16

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30. If
$$\begin{vmatrix} 2 & 2 & 2 \\ x-1 & y-2 & z-3 \\ 1 & 2 & 3 \end{vmatrix} = 3$$
, then $\begin{vmatrix} 1 & 2 & 3 \\ x & y & z \\ 4 & 4 & 4 \end{vmatrix} =$

$$b) - 8$$

c) 6

$$d) -12$$

e) 0