PURDUE UNIVERSITY

STUDY GUIDE FOR COLLEGE ALGEBRA AND/OR TRIGONOMETRY, MA 153 or 154

For Students Who Plan To Obtain Credit In MA 153 or 154 By Examination

This study guide describes briefly the topics one should master before one attempts to take the examination in Algebra and/or Trigonometry. This material can be found in many currently available textbooks, many of which are entitled Algebra and Trigonometry or Precalculus Mathematics. The outline that follows is based on the text *Algebra and Trigonometry with Analytic Geometry*, Classic 11th edition, by Earl W. Swokowski and Jeffery A. Cole; Brooks/Cole Publishing Co. 2005.

IMPORTANT:

1. If you plan to establish credit by examination, read this material thoroughly.
2. Study all of the material listed in the outline.
3. Work many practice problems.
4. When you feel you are prepared for it, take the sample examination.
5. When you believe your preparation to be completed, go to your academic advisor, obtain a credit–exam request form, and follow the instructions given therein.
6. A scientific calculator is required when you take the exam (**single-line display**, non-programmable, non-graphing).

PART I (MA 153)

FUNDAMENTAL CONCEPTS OF ALGEBRA - real numbers, coordinate lines, integral exponents, radicals, rational exponents, polynomials and algebraic expressions, factoring, fractional expressions.

EQUATIONS AND INEQUALITIES - linear equations, quadratic equations, miscellaneous equations, inequalities, applications.

FUNCTIONS - coordinate systems in two dimensions, properties of functions, graphs, linear functions, composition of functions, inverse functions, variation.

POLYNOMIAL FUNCTIONS - operations on polynomials, quadratic functions, polynomial functions of degree greater than 2, graphs.

EXPONENTIAL AND LOGARITHMIC FUNCTIONS - exponential functions, logarithmic functions, properties of logarithms and exponents, exponential and logarithmic equations.

SYSTEMS OF EQUATIONS AND INEQUALITIES - systems of equations, systems of linear equations in two variables.

PART II (MA 154)

THE TRIGONOMETRIC FUNCTIONS - the trigonometric functions, angles in radians and degrees, trigonometric functions of angles, values of the trigonometric functions, graphs of the trigonometric functions, additional graphical techniques, applications involving right triangles.

ANALYTIC TRIGONOMETRY - the fundamental identities, trigonometric identities, trigonometric equations, the addition formulas, multiple–angle formulas, sum and product formulas, the inverse trigonometric functions, the law of sines, the law of cosines, vectors.

COMPLEX NUMBERS - definition of complex numbers, operations on complex numbers, complex roots of equations, trigonometric form for complex numbers.

ADDITIONAL TOPICS - rational functions, conic sections, polar coordinates, and parametric equations.

A table of formulas is included for PART II. Some sample questions are attached.

MA 153 PRACTICE QUESTIONS FOR THE FINAL 8/01

1. Simplify: $\dfrac{\frac{15}{5}}{1-\frac{1}{2}}$.

   A. 2/3 B. 2 C. 3/2 D. 6 E. None of the above.

2. Factor: $16x^2 - 4y^8$

   A. $(4x-y^2)(4x+y^2)$ B. $(4x-2y^4)^2$ C. $4(2x-y^4)(2x+y^4)$ D. $4(2x-y^2)$ E. None of the above.

3. Simplify: $\left(\dfrac{4a^4b^8}{c^{-2}}\right)^{-1/2}$. (All letters denote positive real numbers.)

   A. $\dfrac{1}{2a^2b^4c}$ B. $\dfrac{2a^2b^4}{c}$ C. $\dfrac{a^4b^3}{16c^2}$ D. $\dfrac{c}{2a^2b^4}$ E. None of the above.

4. Subtract and simplify: $\dfrac{3x}{3x+1} - \dfrac{x}{x-2}$.

   A. $\dfrac{2x^2-1}{(3x+1)(x-2)}$ B. $\dfrac{-3x^2}{(3x+1)(x-2)}$ C. $\dfrac{-7x}{(3x+1)(x-2)}$ D. $\dfrac{2x}{(3x+1)(x-2)}$
   E. None of the above.

5. Divide and simplify: $\dfrac{x-2}{x^2-2x-3} \div \dfrac{x^2-x-2}{x^2-9}$.

   A. $\dfrac{(x-2)^2}{(x-3)^2(x+3)}$ B. $\dfrac{x+3}{(x+1)^2}$ C. $\dfrac{x+3}{x+1}$ D. $\dfrac{1}{x+3}$ E. None of the above.

6. A job takes 4 hours for two people working together. If one person works alone he can do the job in 6 hours. How long will it take the other person working alone to complete the job?
   A. 4 hrs. B. 6 hrs. C. 8 hrs. D. 10 hrs. E. None of the above.

7. Write without negative exponents: $\dfrac{xy^{-1}}{(x+y)^{-1}}$.

   A. $\dfrac{x(x+y)}{y}$ B. $\dfrac{x^2}{x+y}$ C. $\dfrac{x+y}{xy}$ D. $\dfrac{xy}{x+y}$ E. None of the above.

8. Simplify by rationalizing the denominator: $\dfrac{\sqrt{3}}{2+\sqrt{3}}$.

   A. $\dfrac{1}{2}$ B. 2 C. $2\sqrt{3}-3$ D. $\sqrt{3}+2$ E. $\dfrac{2\sqrt{3}-3}{7}$

9. Let x and y be two consecutive positive integers such that x is less than y and the difference of their squares is 145. Find x.
   A. 73 B. 72 C. 12 D. 8 E. None of the above.

10. If $A = P(1+rt)$, then $t =$
    A. $\dfrac{A-P}{r}$ B. $A-P$ C. $\dfrac{A-P}{P}$ D. $\dfrac{A}{P}$ E. None of the above.

11. A truck enters a freeway traveling 40 mph. One hour later a car enters the same freeway traveling 55 mph. After how many miles will the car overtake the truck?
    A. $146\frac{2}{3}$ miles B. $201\frac{2}{3}$ miles C. 120 miles D. $106\frac{2}{3}$ E. None of the above.

12. A square of side x is inscribed in a circle. Express the area, A, of the circle as a function of x.
A. $A = \frac{\pi}{2}x^2$ B. $A = x^2$ C. $A = \pi x^2$ D. $A = \frac{\pi}{4}x^2$ E. None of the above.

13. Solve for p : $\dfrac{4}{2p-3} + \dfrac{10}{4p^2-9} = \dfrac{1}{2p+3}$
A. $p = -\frac{3}{2}$ B. $p = \frac{5}{6}$ C. There is no solution D. $p = -\frac{25}{6}$ E. None of the above.

14. How many ml of a 50% acid solution should be added to 40 ml of a 20% acid solution to obtain a solution that is 25% acid?
A. 10 ml B. 8 ml C. 6 ml D. 4 ml E. None of the above.

15. Solve for x : $x = \sqrt{14+5x}$.
A. $x = 3, x = 14$ B. $x = -2, x = 7$ C. $x = -2$ D. $x = \frac{14}{3}$ E. None of the above.

16. Find all solutions: $m^4 - m^2 - 6 = 0$.
A. $m = 2, 3$ B. $m = -2, \pm\sqrt{3}$ C. $m = \pm\sqrt{3}, \pm 2i$ D. $m = \pm\sqrt{3}, \pm\sqrt{2}i$ E. None of the above.

17. Solve the inequality and express the solution in terms of intervals: $3x - 2 > 6x + 1$
A. $(-\infty, -1)$ B. $(-1, 1)$ C. $(-\infty, -1]$ D. $(-1, \infty)$ E. None of the above.

18. Solve the inequality: $\mid 6 - 2x \mid \leq 3$.
A. $x \geq \frac{3}{2}$ B. $x \leq \frac{3}{2}$ C. $\frac{3}{2} \leq x \leq \frac{9}{2}$ D. $-\frac{9}{2} \leq x \leq -\frac{3}{2}$ E. None of the above.

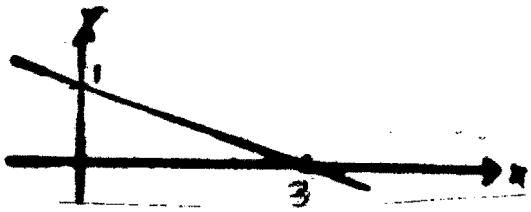
19. Find all values of k so that the solutions of the following equation are real numbers:
$2x^2 - 4x + k = 0$.
A. $k = 2$ B. $k > 2$ C. $k \geq 2$ D. $k \leq 2$ E. None of the above.

20. The base of a triangle is three inches more than its height. If each is increased by 3 inches the area is 14 square inches. Find the original base (b) and original height (h) in inches.
A. $b = 4, h = 1$ B. $b = 9, h = 6$ C. $b = 8, h = 5$ D. $b = 7/2, h = l/2$ E. None of the above.

21. Solve for x:
$$2x^2 + y^2 = 1$$
$$x - y = 1$$
A. $x = 2/3$ B. $x = 0, 2/3$ C. $x = -2/3$ D. $x = 0, 3/2$ E. None of the above.

22. If the point $(2, 3)$ is midway between A and B and the point A has coordinates $(1, -2)$, find the coordinates of the point B.
A. **(1,5)** **B. (3,1)** C. (3,8) D. (3/2,1/2) E. None of the above.

23. The **slope of a line perpendicular to the line drawn is:**

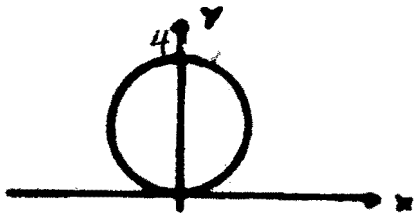


A. **1/3** **B. −1/3** C. −3 D. 3 E. None of these.

24. If m varies directly as the product of x and y and inversely as z, find the constant of proportionality k if $m = 3$ when $x = 4, y = 2$ and $z = 6$.
A. $k = 1/6$ B. $k = 9/4$ C. $k = 3$ D. $k = 1/4$ E. None of the above.

25. Give the equation of the line in slope-intercept form which is parallel to the line $2x - 3y = 7$ and contains the point $(4, -1)$.
A. $y = \frac{3}{2}x - 7$ **B.** $y = -\frac{2}{3}x + \frac{5}{2}$ C. $y = \frac{2}{3}x - \frac{11}{3}$ D. $y = \frac{2}{3}x + \frac{14}{3}$ E. None of the above.

26. The equation for the circle shown is:

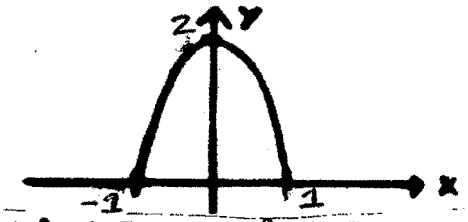


A. $x^2 + y^2 = 4$ **B.** $x^2 + y^2 - 4y = 0$ C. $x^2(y - 2) = 4$ D. $x^2 + y^2 + 4y = 0$
E. $x^2 + y^2 + 4x + 4y - 8 = 0$

27. Determine $(g \circ f)(x)$ for the following functions: $f(x) = 1 - \sqrt{x}$ and $g(x) = 1/x$.
A. $-\sqrt{x}$ B. $1 - \sqrt{1/x}$ C. $1 - \sqrt{x}$ D. $\frac{1}{1 - \sqrt{x}}$ E. $1/\sqrt{x}$

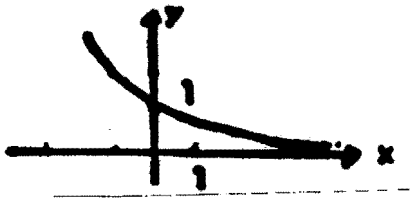
28. If $f(x) = \frac{x}{x^2 + 1}$, find $\frac{1}{f(3)}$.
A. 3/10 B. 3/16 C. **16/3** D. 10/3 E. None of these.

29. The graph below could best be described by which equation?



A. $y = 2x^3 + 2$ **B.** $y = -2x^2 + 2$ C. $y = -2x^2 - 2$ D. $y = 2x^2 - 2$ E. $y = -(x - 2)^2$

30. The figure below most closely resembles the graph of which function?



A. $y = (1/2)^x$ **B.** $y = 2^x$ C. $y = -2^x$ D. $y = -(1/2)^x$ E. $y = 1 - 2^x$

31. Express as one logarithm: $\log_b y^3 + \log_b y^2 - \log_b y^4$
A. $\log_b y^2$ **B.** $\log_b y$ C. $\log_b(y^3 + y^2 - y^4)$ D. $\log_b \frac{y^3 + y^2}{y^4}$ E. None of the above.

32. Which are true of the function $f(x) = \log_a x$ if $a > 1$?
I. f is an increasing function. II. f has a as an x intercept. III. f has 1 as a y intercept. IV. The domain of f is $(0, \infty)$. List all correct answers.

A. I, II and III B. I and II C. II and IV D. I and IV E. I and III

33. Which of the following is equivalent to $\log\left(\dfrac{432}{\sqrt{.095}\sqrt[3]{72.1}}\right)$?

A. $\log 432 - \frac{1}{2}\log .095 - 3\log 72.1$ B. $\log 432 - \frac{1}{2}\log .095 - \frac{1}{3}\log 72.1$
C. $\log 432 - 2\log .095 + 3\log 72.1$ D. $\log 432 - \frac{1}{2}\log .095 + \frac{1}{3}\log 72.1$
E. $\log 432 - 2\log .095 - 3\log 72.1$

34. Solve for x : $3^{x-5} = 4$.

A. $x = \log 4 + 5\log 3$ B. $x = 5 + \log(4/3)$ C. $x = 5 + \dfrac{\log 4}{\log 3}$

D. $x = 5 + \log 4$ E. $x = \dfrac{5 + \log 4}{\log 3}$

35. Solve for x : $\log_3 \sqrt{2x+3} = 2$.

A. $x = 5/2$ B. $x = 3/2$ C. $x = 39$ D. $x = 17$ E. $x = 3$

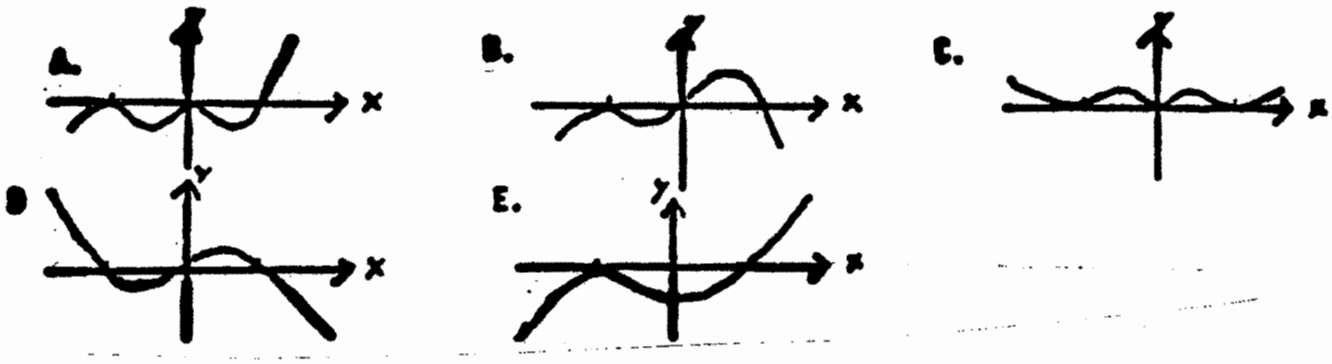
36. Given that $\log_3 m = 8, \log_3 n = 10$ and $\log_3 p = 6$. Calculate $\log_3\left(\dfrac{\sqrt{mn}}{p^3}\right)$.

A. -9 B. $\dfrac{2\sqrt{5}}{27}$ C. 22 D. -56 E. -4

37. The graph of $y = 2 + 2^x$ crosses the y-axis at

A. 0 B. 1 C. 2 D. 3 E. 4

38. Which of the following looks most like the graph of $y = x^2(x-1)(x+1)^2$?



39. Which set of equations below has no solution?

A. $\begin{matrix} 2x + 3y = 8 \\ 3x - 2y = 4 \end{matrix}$ B. $\begin{matrix} 3x + 4y = 5 \\ 6x + 8y = 10 \end{matrix}$ C. $\begin{matrix} 2x - 3y = 4 \\ -4x + 6y = 3 \end{matrix}$ D. $\begin{matrix} x - 4y = 6 \\ 2x - 4y = 6 \end{matrix}$ E. $\begin{matrix} 3x - 2y = 4 \\ 6x + 4y = 8 \end{matrix}$

40. Determine where the two lines $x + 4y = 3$ and $2x - 6y = 8$ intersect.

A. $x = \frac{-12}{5}, y = \frac{6}{5}$ B. $x = \frac{1}{3}, y = \frac{4}{9}$ C. $x = \frac{2}{7}, y = \frac{5}{7}$ D. $x = \frac{1}{8}, y = \frac{2}{5}$ E. None of the above.

41. The value of a rare book is increasing linearly. It was worth \$54 in 1981 and \$62 in 1983. What is the formula for the value (v) of the book t years after 1980?

A. $v = 50 + 4t$ B. $v = 48 + 3t$ C. $v = 50 + 3t$ D. $v = 51 + 4t$ E. None of the above.

42. If $f(x) = x^2 - 2x + 4$ then $\dfrac{f(x+h) - f(x)}{h} =$

A. $2x + h - 2$ B. $x + 2h - 2$ C. $x + 2h + 2$ D. $2x - h - 2$ E. $2x - h + 2$.

43. An aquarium in the shape of a rectangular box is to have a height of 1.5 feet and a volume of 6 cubic feet. Let x denote the length of the base and y the width of the base. Express y as a function of x.

A. $y = 1.5x$ B. $y = \frac{4}{x}$ C. $y = x^2$ D. $y = \frac{6}{x}$ E. $y = 9x$

44. If $\log_x 2 = 5$, solve for x. Give you answer correct to four decimal places. (Hint: Change to exponential notation.)
A. 2.2361 B. 1.4142 C. 0.6990 D. 1.1487 E. 0.3010

SOLUTION

1. D; 2. C; 3. A; 4. C; 5. B; 6. E [12 hrs.]; 7. A; 8. C; 9. B; 10 E $[(A-P)/Pr]$; 11. A; 12 A; 13 D; 14. B; 15. E $[x = 7]$; 16. D; 17. A; 18. C; 19. D; 20. A; 21. B; 22. C; 23. D; 24. B; 25. C; 26. B; 27. D; 28. D; 29. B; 30. A; 31. B; 32. D; 33. B; 34. C; 35. C; 36. A; 37. D; 38. A; 39. C; 40. E$[x = \frac{25}{7}, y = \frac{-1}{7}]$; 41. A; 42. A; 43. B. 44. D

1. If θ is in the second quadrant and $\sin\theta = 0.6$, find $\cos\theta$.

A. -0.75
B. 0.2
C. -0.8
D. 0.8
E. None of the above.

2. The angles with measures listed are all coterminal except:

A. $\frac{\pi}{3}$
B. $-\frac{5\pi}{3}$
C. $-300°$
D. $420°$
E. $-60°$

3. The radian measure of an angle of $135°$ is:

A. $\frac{5\pi}{4}$
B. $\frac{3\pi}{2}$
C. $\frac{3\pi}{4}$
D. $\frac{7\pi}{8}$
E. None of the above.

4. Use a calculator to find the sec $126°$ correct to 4 decimal places.

A. 1.2361
B. -0.5878
C. -1.7013
D. -1.2361
E. None of the above.

5. The point $(12, -16)$ is on the terminal side of the angle θ. Find $\tan\theta$

A. $\frac{5}{3}$
B. $-\frac{5}{4}$
C. $\frac{4}{3}$
D. $\frac{4}{5}$
E. None of the above.

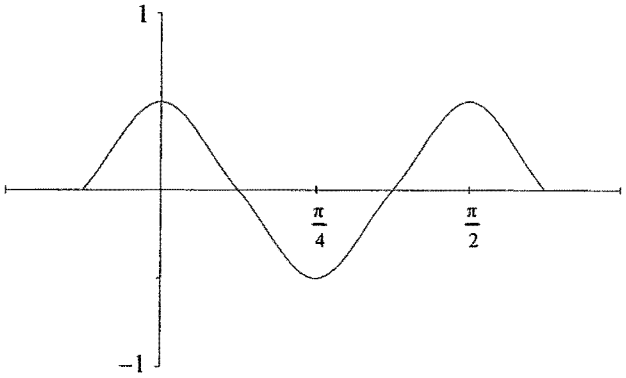
6. If the diameter of a circle is 6 cm, find the length of the arc that subtends a central angle of $30°$.

A. 1.571 cm
B. 2.356 cm
C. 3.142 cm
D. 9.425 cm
E. None of the above.

7. Find the area of a sector determined by θ in problem #6.

A. 1.571 cm^2
B. 2.356 cm^2
C. 3.142 cm^2
D. 9.425 cm^2
E. None of the above.

8. Sketched below is a portion of the graph of which trigonometric function?



A. $y = \frac{1}{2}\cos\left(\frac{1}{4}x\right)$
B. $y = 4\cos(2x)$
C. $y = \frac{1}{2}\cos(4x)$
D. $y = 4\cos\left(\frac{1}{2}x\right)$
E. $y = \frac{1}{4}\cos(2x)$

9. The graph of $y = 3 + \sin x$ (Choose all the correct answers.)

I. crosses the y-axis at 3
II. crosses the x-axis at multiples of π
III. is always above the x-axis
IV. has period 2π

A. I, II
B. I, III, IV
C. I, II, IV
D. II, IV
E. None of the above.

10. Give the domain, D, and the range, R, of $f(x) = \cos x$.

A. D = set of all real numbers, R=[–1, 1]
B. $D = [0, \infty)$, R = set of all real numbers.
C. $D = [0, 2\pi]$, $R = [-1, 1]$
D. D = set of all real numbers, $R = [0, 2\pi]$
E. None of the above.

11. From a point P on level ground the angle of elevation of the top of the tower is 26°50'. From a point 25.0 meters closer to the tower and on the same line with P and the base of the tower, the angle of elevation of the top of the tower is 43°30'. Find the height of the tower correct to one decimal place.

A. 39.3 meters
B. 12.6 meters
C. 27.1 meters
D. 23.7 meters
E. None of the above.

12. The expression $\dfrac{\tan^2 x}{1+\sec x}$ is equal to:

A. 1
B. $\sec x - 1$
C. $\tan x + \sin x$
D. $\tan^2 x + \sin x \tan x$
E. $\csc x + \sin x$

13. Simplify $\dfrac{\tan x \cos x \csc x}{\cot x \sec x \sin x}$.

A. $\tan^2 x \cos^2 x$
B. 1
C. $\csc^2 x$
D. 0
E. $\tan^2 x$

14. Reduce to a single term: $\cos(2A)\cos B + \sin(2A)\sin B$.

A. $\sin(2A + B)$
B. $\sin(2A - B)$
C. $\cos(2A - B)$
D. $\cos(2A + B)$
E. None of the above.

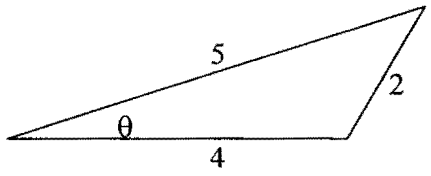
15. Find all the solutions of $3\cos^2 x + 2\sin x + 2 = 0$ in the interval $[0, 2\pi)$

A. $x = 0, \dfrac{\pi}{2}$
B. $x = \dfrac{\pi}{4}, \dfrac{\pi}{2}$
C. $x = \dfrac{\pi}{2}$
D. $x = \dfrac{\pi}{4}$
E. None of the above.

16. How many solutions of the equation $\sin 2\theta = \cos\theta$ lie in the interval $[0, 2\pi)$?

A. 2
B. 3
C. 4
D. 1
E. None of the above.

17. Find $\cos\theta$ in the given triangle.

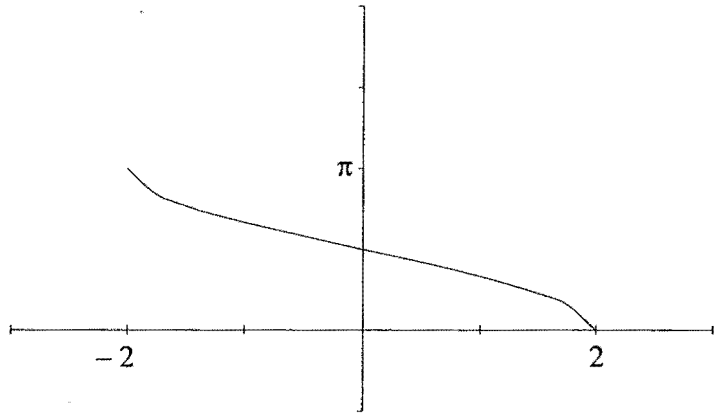


A. $\frac{37}{20}$
B. $\frac{7}{40}$
C. $\frac{5}{16}$
D. $\frac{37}{40}$
E. None of the above

18. Given $\cos\theta = \frac{3}{4}$ and $270° < \theta < 360°$, find $\sin 2\theta$

A. $\frac{-3\sqrt{7}}{8}$
B. $\frac{-\sqrt{7}}{4}$
C. $\frac{1}{8}$
D. $\frac{3\sqrt{7}}{8}$
E. None of the above.

19. Which equation best describes the graph given below?



A. $y = 2\sin^{-1}(x)$
B. $y = \cos^{-1}\left(\frac{x}{2}\right)$
C. $y = 2\cos^{-1}(x)$
D. $y = \sin^{-1}\left(\frac{x}{2}\right)$
E. None of the above.

20. Find the $\cos\left(2\arcsin\left(\frac{4}{5}\right)\right)$. Do not use a calculator.

A. $\frac{7}{25}$
B. $-\frac{7}{25}$
C. $\frac{32}{25}$
D. $-\frac{32}{25}$
E. None of the above.

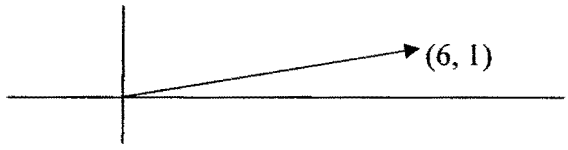
21. Point A is 2.0 miles north of B. The bearing from A to C is $S35°W$ and the bearing from B to C is $S86°W$. Find the distance from A to C correct to one decimal place.

A. 2.6 miles
B. 1.6 miles
C. 1.5 miles
D. 3.5 miles
E. None of the above.

22. Find the magnitude of the vector $\langle 2,3\rangle$

A. 6
B. $\sqrt{6}$
C. 13
D. $\sqrt{13}$
E. None of the above.

23. If $\vec{a} = \langle 2,2\rangle$ and $\vec{b} = \langle -2,3\rangle$, the sketch below corresponds to:

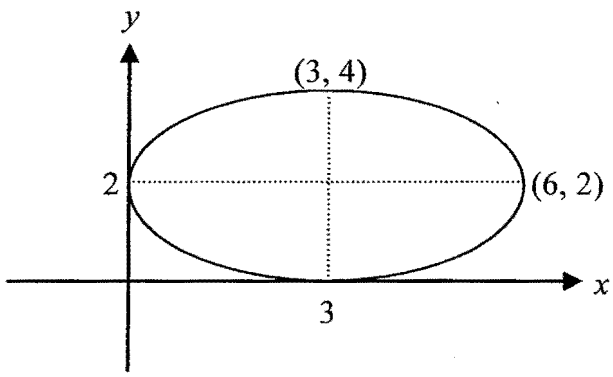


A. $\vec{a}+\vec{b}$
B. $\vec{a}-\vec{b}$
C. $2\vec{a}+\vec{b}$
D. $2\vec{a}-\vec{b}$
E. None of the above.

24. If 6.0 lb, 110° is the magnitude and direction of one force and 2.0 lb, 240° is the magnitude and direction of a second force, calculate the magnitude (to one decimal place) and the direction (to the nearest degree) of the resultant.

A. 5.0 lb, 128°
B. 7.4 lb, 121°
C. 5.0 lb, 121°
D. 7.4 lb, 128°
E. None of the above.

25. Which equation best describes that graph given below?



A. $\frac{(x-6)^2}{3}+\frac{(y-4)^2}{2}=1$

B. $\frac{(x-6)^2}{9}+\frac{(y-4)^2}{9}=1$

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

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

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

26. Classify the equations given below.

I. $x^2-y^2+2x=15$

II. $x^2+3y^2+4x-2y-5=0$

III. $x^2-4x+y-7=0$

A. *I. ellipse*, *II. parabola*, *III. hyperbola*

B. *I. hyperbola*, *II. ellipse*, *III. parabola*

C. *I. parabola*, *II. hyperbola*, *III. ellipse*

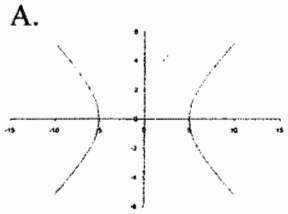
D. *I. hyperbola*, *II. parabola*, *III. ellipse*

E. *I. parabola*, *II. ellipse*, *III. hyperbola*

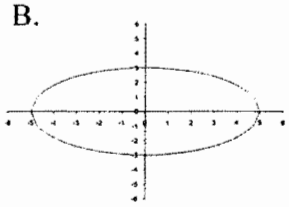
F. *I. ellipse*, *II. hyperbola*, *III. parabola*

27. The graph of $9x^2 - 25y^2 = 225$ most closely resembles which graph sketched below?

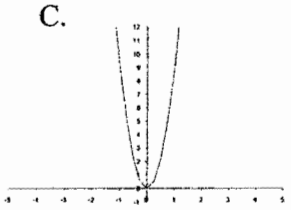
A.



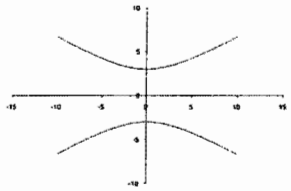
B.



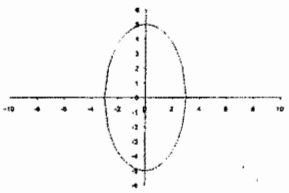
C.



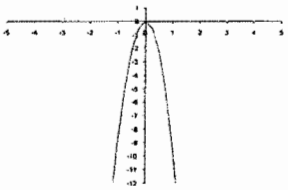
D.



E.



F.



28. Find the vertex of the parabola $y^2 - 4y - 2x - 4 = 0$

A. (2, –8)
B. (–4, 2)
C. (2, –4)
D. (–8, 2)
E. None of the above.

29. An arch of a bridge over a roadway is semi elliptical with major axis horizontal. The base of the arch is 30 feet across and highest part of the arch is 10 feet above the horizontal roadway. Find the height of the arch 10 feet from the center of the base.

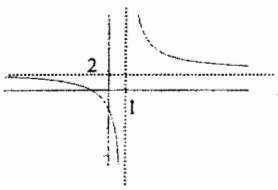
A. 9.4 feet
B. 8.9 feet
C. 7.5 feet
D. 10.0 feet
E. None of the above.

30. What are the vertical asymptotes of the graph of $f(x) = \dfrac{x^2 - 9}{x^2 + 2x}$?

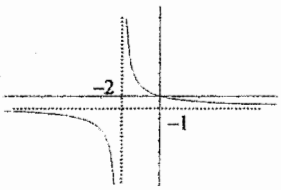
A. $x = 0$
B. $x = 2$
C. $x = 0, x = -2$
D. $x = 3, x = -3$
E. None of the above.

31. The graph of $f(x) = \dfrac{x - 2}{x + 2}$ most closely resembles which graph sketched below?

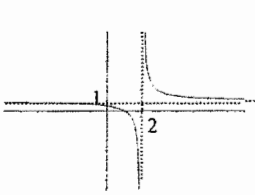
A



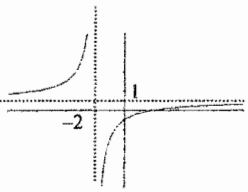
B.



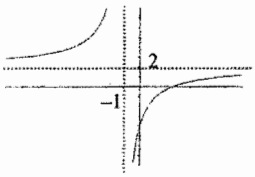
C.



D.



E.



32. Find the reference angle for $\theta = -156°$

A. $\theta_R = 156°$
B. $\theta_R = 204°$
C. $\theta_R = 66°$
D. $\theta_R = 24°$
E. None of the above.

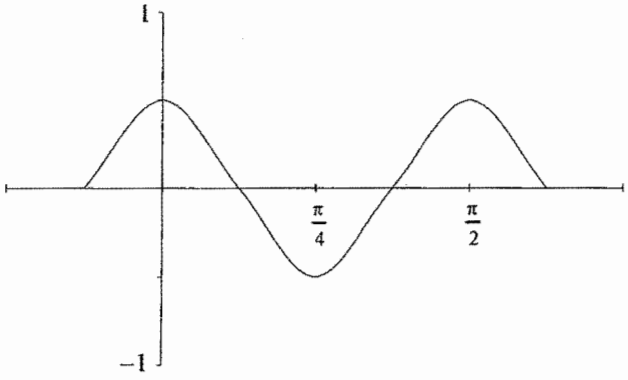
33. Find the reference angle for $\theta = \dfrac{4\pi}{3}$

A. $\theta_R = \dfrac{\pi}{3}$
B. $\theta_R = \dfrac{4\pi}{3}$
C. $\theta_R = \dfrac{2\pi}{3}$
D. $\theta_R = -\dfrac{2\pi}{3}$
E. None of the above.

34. Find all the values of θ in the interval $[0, 2\pi)$ that satisfies the equation $\sin\theta = -0.5873$. Round your answer to two decimals.

A. –0.63, 3.77
B. 0.63, 2.51
C. 3.77, 5.66
D. 5.34, 2.20
E. None of the above.

35. Sketched below is a portion of the graph of which trigonometric function?



A. $y=\frac{1}{2}\sin\left(4x+\frac{\pi}{2}\right)$

B. $y=4\sin\left(\frac{1}{2}x-\frac{\pi}{2}\right)$

C. $y=\frac{1}{2}\sin\left(\frac{1}{4}x+\frac{\pi}{2}\right)$

D. $y=4\sin\left(\frac{1}{2}x+\frac{\pi}{2}\right)$

E. $y=\frac{1}{2}\sin\left(4x-\frac{\pi}{2}\right)$

36. Find the unit vector of $5i-8j$.

A. $-\frac{5}{\sqrt{89}}i+\frac{8}{\sqrt{89}}j$

B. $\frac{5}{\sqrt{39}}i-\frac{8}{\sqrt{39}}j$

C. $\frac{5}{\sqrt{89}}i-\frac{8}{\sqrt{89}}j$

D. $-\frac{5}{\sqrt{39}}i+\frac{8}{\sqrt{39}}j$

E. None of the above.

37. Find the vector of magnitude 5 that is in the opposite direction of $\langle -4,7\rangle$.

A. $\left\langle \frac{20}{\sqrt{65}},-\frac{35}{\sqrt{65}}\right\rangle$

B. $\left\langle -\frac{20}{\sqrt{33}},\frac{35}{\sqrt{33}}\right\rangle$

C. $\left\langle -\frac{20}{\sqrt{65}},\frac{35}{\sqrt{65}}\right\rangle$

D. $\left\langle \frac{20}{\sqrt{33}},-\frac{35}{\sqrt{33}}\right\rangle$

E. None of the above.

Answers:

1	C		20	B
2	E		21	A
3	C		22	D
4	C		23	D
5	E (-4/3)		24	A
6	A		25	C
7	B		26	B
8	C		27	A
9	B		28	B
10	A		29	C
11	C		30	C
12	B		31	D
13	B		32	D
14	C		33	A
15	E ($3\pi/2$)		34	C
16	C		35	A
17	D		36	C
18	A		37	A
19	B			

MA 154 FORMULA SHEET

ADDITION AND SUBTRACTION FORMULAS

$\sin(u+v) = \sin u\cos v + \cos u \sin v$

$\sin(u-v) = \sin u\cos v - \cos u \sin v$

$\cos(u+v) = \cos u\cos v - \sin u \sin v$

$\cos(u-v) = \cos u\cos v + \sin u \sin v$

$\tan(u+v) = \dfrac{\tan u + \tan v}{1 - \tan u \tan v}$

$\tan(u-v) = \dfrac{\tan u - \tan v}{1 + \tan u \tan v}$

DOUBLE-ANGLE FORMULAS

$\sin(2u) = 2\sin u \cos u$

$\cos(2u) = \cos^2 u - \sin^2 u$

$\tan(2u) = \dfrac{2\tan u}{1 - \tan^2 u}$

PYTHAGOREAN IDENTITIES

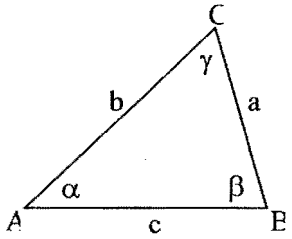
$\sin^2\theta + \cos^2\theta = 1$

$1 + \tan^2\theta = \sec^2\theta$

$1 + \cot^2\theta = \csc^2\theta$

LAW OF SINES

$$\frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$$



LAW OF COSINES

$c^2 = a^2 + b^2 - 2ab\cos\gamma$

ANGLE BETWEEN TWO VECTORS:

$$\cos\theta = \frac{(\vec{a})\bullet(\vec{b})}{\|\vec{a}\|\,\|\vec{b}\|}$$

STANDARD FORM FOR CONICS:

$\dfrac{(x-h)^2}{a^2} + \dfrac{(y-k)^2}{b^2} = 1$

$\dfrac{(x-h)^2}{a^2} - \dfrac{(y-k)^2}{b^2} = 1$

$(y-k)^2 = 4p(x-h)$

$\dfrac{(x-h)^2}{b^2} + \dfrac{(y-k)^2}{a^2} = 1$

$\dfrac{(y-k)^2}{a^2} - \dfrac{(x-h)^2}{b^2} = 1$

$(x-h)^2 = 4p(y-k)$

8/02