HOMEWORK 7.

Reading assignment: Textbook sections corresponding to the homework assignments

Section 3.1 (Rectangular coordinate system)

pages 172-173: Problems **2, 4, 6, 8, 10, 12, 14, 22, 60**

2. Plot the given points on the same coordinate axes:

(-3,4), (5,-2), (-1,-3), (-1,3/2), (0,1.5)

(3. – 8.) Find the distance between each pair of points and find the midpoint

4. **(-4, 5) , (-2, 3)** $\mathbf{d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}}$

6. **(-3, 0) , (2, -4)**

8. **(-1/2, 3) , (-1, -3/4)**

(9. – 12.) Find the length of the shortest side of the triangle determined by the three given points:

10. ***P*** **(2, -3) ,** ***Q*** **(4, 4) ,** ***R*** **(-1, -1)**

12. ***F*** **(-5, -1) ,** ***G*** **(0, 2) ,** ***H*** **(1, -2)**

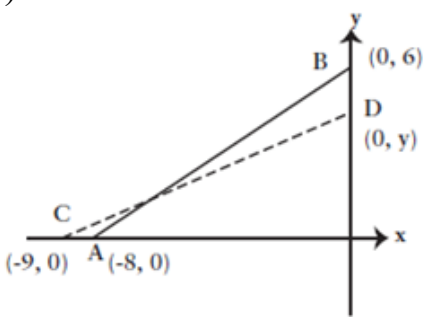
(13. – 16.) Determine if the given points form a right triangle
(*HINT*: A triangle is a right triangle if and only if the lengths of the sides satisfy the Pythagorean Theorem.)

14. **(2, -3) , (-1, 1) , (3, 4)**

(17. – 20.) Show that the points lie on the same line. (*HINT*: Three points are collinear if and only if the sum of the lengths of two sides equals the length of the third side.)

22. **(-2, -1) , (2, 2) , (5, -2)**

60. A ladder leans against a wall. The foot of the ladder is 8 feet from the wall, and the top of the ladder is pulled 1 foot away from the wall. How far will the top of the ladder slide down the wall? (*HINT*: Draw the coordinate axes and place the ladder up against the *y*-axis.)



HOMEWORK 7., *continued*

Section 3.4 (Linear functions)

page 211: Problems **2, 4, 6, 10, 12, 14, 16, 20, 22**

(1. – 6.) Determine the slope of the line through the given points. State whether the line is a graph of an increasing function, a decreasing function, a constant function, or not a function.

2. **(1, 2) , (-2, 5)**

4. **(2, 4) , (-3, 4)**

6. **(-4, 1) , (-1, -2)**

(9. – 12.) Determine an equation of the line with the given slope m that passes through the given point.

10. $m = -\frac{1}{2}$ **, (1, -2)**

12. $m = 0$ **, (-1, 3)**

(13. – 18.) Determine an equation of the line through the given points.

14. **(-3, 5) , (1. 7)**

16. **(-2, 4) , (3, 4)**

(19. – 24.) Determine an equation of the line with the given slope m and the given y-intercept b.

20. $m = -3$ **,** $b = -3$

22. $m = -\frac{1}{2}$ **,** $b = \frac{1}{2}$

HOMEWORK 8.

Section 3.4 Linear (straight line) functions

pages 211-214: Problems **42, 44, 46*, 50, 64, 72***

(41. – 44.) Determine an equation of the line through the given point that is a) parallel to the given line, and b) perpendicular to the given line.

42. **(-1, 2); $3y + 2x = 6$**

44. **(-1, -3); $3y + 4x - 5 = 0$**

46. The college bookstore sells a textbook that costs \$80 for \$94 and a textbook that costs \$84 for \$98.70. If the markup policy of the bookstore is linear, write a linear function that relates sales price S and cost C. What is the cost of a book that sells for \$105.75?

* **Problem 46**, the sales price S is a *linear* function of the cost C so you can write $S = m\,C + b$, where m and b are constants to be found.

50. Find a real number c such that the line $cx - 5y + 8 = 0$ has x-intercept 4.

64. What is the distance a car will travel in 12 minutes of it is going 50 mph?

72* Katy buys a car for \$20,500. In 3 years the value of the car is \$14,500.

* **Problem 72**, *depreciates linearly* means that the value of the car, as a function of time can be written as $V = m\,t + b$, where t is time and m and b are constants to be found.

72a. If the value of the car depreciates linearly, find the equation relating time and the value of the car.

72b. In how many years would the car be worthless?

Review Problems

Section 1.4 (Factoring) page 39: Problem **82**

82a. Factor completely:

$$\left\{\frac{n(n+1)}{2}\right\}^2 + (n+1)^3$$

82b. Factor completely:

$$\frac{n(n+1)(2n+1)}{6} + (n+1)^2$$

82c. Factor completely:

$$\frac{1}{b}(a+bx)^2 - \frac{a}{b}(a+bx)$$

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HOMEWORK 8., *continued*

Section 1.5 (Rational Expressions) pp 47-48: Problems **34, 36, 38, 40, 42 , 54, 56, 58, 60, 62**

34. Perform the indicated operations and simplify: $\frac{1}{x-1}+\frac{2}{x-2}$

36. Perform the indicated operations and simplify: $\frac{a}{8b}-\frac{b}{12a}$

38. Perform the indicated operations and simplify: $\frac{4x-1}{6x^3}+\frac{2}{3x^2}$

40. Perform the indicated operations and simplify: $\frac{x}{x-y}-\frac{y}{x+y}$

42. Perform the indicated operations and simplify: $\frac{4}{r}-\frac{3}{r+2}$

54. Simplify the complex fraction and perform all indicated operations: $\dfrac{1-\frac{r^2}{s^2}}{1+\frac{r}{s}}$

56. Simplify the complex fraction and perform all indicated operations:

$$\frac{\frac{a}{a-b}-\frac{b}{a+b}}{a^2-b^2}$$

58. Simplify the complex fraction and perform all indicated operations:

$$\frac{\frac{4}{x^2-4}+1}{\frac{x}{x^2+x-6}}$$

60. Simplify the complex fraction and perform all indicated operations:

$$\frac{\frac{x}{x-2}-\frac{x}{x+2}}{\frac{2x}{x-2}+\frac{x^2}{x-2}}$$

62. Simplify the complex fraction and perform all indicated operations:

$$2+\frac{3}{1+\frac{2}{1-x}}$$

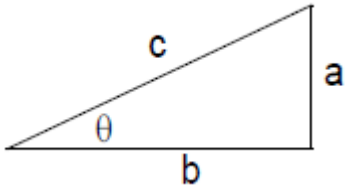
Problem HW7.1

Find the value of x if $x = \log_{11}(12)$, " log to the base 11 of 12"

HOMEWORK 9.

1. Write expressions for sin(**θ**), cos(**θ**), and tan(**θ**) in terms of sec(**θ**).

Refer to this figure for the problems below:



2. If a =1 and b =6, find the values of sin(θ), cos(θ), and tan(θ)
3. If c =1 and **θ** = 7 degrees, find a and b.
4. If c =1 and **θ** = 1 radian, find a and b.
5. If a =1 and b =6, find the value of **θ** in degrees and in radians.

For the next two examples use the following:
The Area of a regular Polygon: where: S is the length of any side; N is the number of sides; π is PI, approximately 3.142; and TAN is the tangent function in **radians:**

$$area = \frac{S^2 N}{4 \tan\left(\frac{\pi}{N}\right)}$$

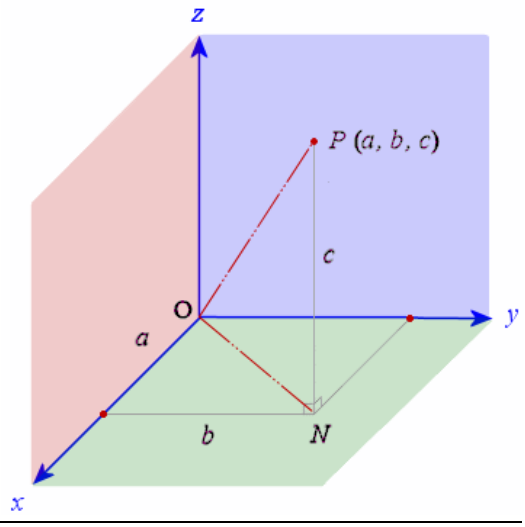
6. Find the area of a regular hexagon if the length of the sides is 1.
7. Find the area of a regular dodecagon (12-sided polygon) if the length of the sides is 1.

---

8. Find the distance between the points (1, 2, 6) and (4, 5, 9)
(Use the 3-dimensional distance formula).

A point is specified by an ordered triple of numbers called its coordinates. Let the coordinates of P_i be (x_i,y_i,z_i), for i = 1 and 2. The distance from P_1 to P_2 is equal to the distance from P_2 to P_1 :

$$\mathbf{d = \sqrt{[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]}}$$



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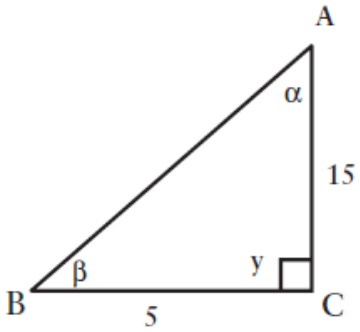
HOMEWORK 10.
Section 7.8 (Special Values and Properties of Trigonometric Functions)
page 487: Problems **2, 4, 6, 8, 10, 12, 14**

Find the required part of the triangle *ABC* if the angle at "C" is 90 degrees.



Problem **2:** If a=5 and b=15, find β.

Problem **4:** A monument is 550 feet high. What is the length of the shadow cast by the monument when the sun is 64° above the horizon?

Problem **6:** A technician positioned on an oil-drilling rig 120 feet above the water spots a boat at an angle of depression of 16°. How far is the boat from the rig?

Problem **8:** A hill is known to be 200 meters high. A surveyor standing on the ground finds the angle of elevation of the top of the hill to be 42°50′. Find the distance from the surveyor's feet to a point directly below the top of the hill.

Problem **10:** An airplane pilot wants to climb from an altitude of 6000 feet to an altitude of 16,000 feet. If the plane climbs at an angle of 9° with a constant speed of 22,000 feet per minute, how long will it take to reach the increased altitude?

Problem **12:** The sides of an isosceles triangle are 15, 15, and 26 centimeters. Find the measures of the angles of the triangle. (Hint: The altitude of an isosceles triangle bisects the base.)

Problem 1**4:** To determine the width of a river, markers are placed at each side of the river in line with the base of a tower that rises 23.4 meters above the ground. From the top of the tower, the angles of depression of the markers are 58°20′ and 11°40′. Find the width of the river

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Review Exercises (The Trigonometric Functions) page 495: Problems **2, 4**
In Exercises 1–4, convert from degree measure to radian measure or from radian measure to degree measure.
Problem **2:** **$3\pi / 2$**
Problem **4:** **45°**

HOMEWORK 11.

Reading assignment: Textbook sections corresponding to the homework assignments

Section 7.4 (Special Values and Properties of Trigonometric Functions)
page 488: Problems **130, 132, 134, 136, 138** (trig identities)

In Exercises 129–138, use trigonometric identities to transform the first expression into the second.

Problem **130:** $\dfrac{\cos t}{\sin t}$, $\dfrac{1}{\tan t}$

Problem **132:** $\tan t \sin t + \cos t$, $\dfrac{1}{\cos t}$

Problem **134:** $\dfrac{1-\cos^2 t}{\sin t}$, $\sin t$

Problem **136:** $\dfrac{\cos^2 t}{1-\sin t}$, $1 + \sin t$

Problem **138:** $\dfrac{1}{1-\sin t} + \dfrac{1}{1+\sin t}$, $\dfrac{2}{\cos^2 t}$

Section 9.1 (Applications of Trigonometry)
Law of Sines **page 570:** Problems **2, 4, 6**

In Exercises 1–12, use the law of sines to approximate the required part(s) of triangle ABC. Give both solutions if more than one triangle satisfies the given conditions.

Problem **2:** If $\alpha = 74°$, $\gamma = 36°$, and $c = 6.8$, find a.

Problem **4:** If $\alpha = 46°$, $\beta = 88°$, and $c = 10.5$, find b.

Problem **6:** If $\beta = 16°30'$, $\gamma = 84°40'$, and $a = 15$, find c.

HOMEWORK 11., *continued*

Section 9.2 (Graphs of the Trigonometric Functions)

Law of Cosines page 542: Problems **2, 4, 6**

In Exercises 1–10, use the law of cosines to approximate the required part of triangle ABC.

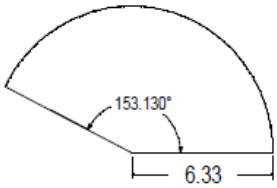
Problem **2:** If $a = 5$, $b = 12$, and $c = 15$, find γ.

Problem **4:** If $b = 20$, $c = 13$, and $\alpha = 19°10'$, find a.

Problem **6:** If $a = 30$, $c = 40$, and $\beta = 122°$, find b.

HOMEWORK 12.

1. Find the length of the arc:

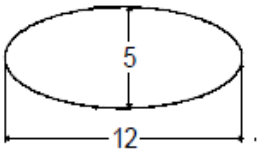


2. Find the volume of a cone with a circular base of radius = 2 and height = 9.

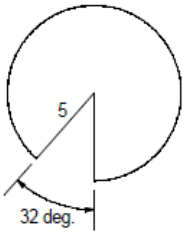
3. Find the volume of a pyramid whose base is an equilateral triangle of side = 3 and height = 8

4. Find the volume of a pyramid with a circular base of radius 1 and height = 8 if the base is in the x-y plane, centered on 0,0,0 and the tip is at $(x, y, z) = (4, 3, 10)$.

5. Calculate the area of an ellipse with height = 5 and width = 12.



6. When the radial lines on the figure below are brought together, a cone is formed. Find the height of the cone and the radius of its circular base.



7. Specify the figure, similar to the figure of Problem 6 which will form a cone of radius = 5 and height =10.

8. Calculate the volume of a spherical shell with an outer diameter of 3 inches and a thickness of 1/4 inch.

9. Find the radius of the sphere whose volume is equal to that of cone of height =6 and radius =4.

10. Find (a formula for) the radius R of the sphere whose volume is equal the volume of a cone with radius r and height h.

REVIEW PROBLEMS:

Solve for x:

1. $c = b/(1- x^2)$

2. $c = bx /(1- x^2)$

3. $x = 1 + 1/x$

Factor

4.**a.** $4 - 9x^2$

4**.b.** $x^2 + 5x + 6$

c. $x^2 + 2x + 1$

d. $x^2 - 2x + 1$

5. Do the indicated operations and simplify

a. $\dfrac{2 - \dfrac{4}{x+1}}{x-1}$ b. $\dfrac{2x}{x^2-9} + \dfrac{5}{3x+9}$

6. Perform the indicated operations

a. $(\sqrt{7}-5)^2$ b. $\dfrac{1}{2}\sqrt{\dfrac{xy}{4}} - \sqrt{9xy}$

7. Simplify and express the answer using only positive exponents

a. $\left(\dfrac{x^{\frac{7}{2}}}{x^{\frac{2}{3}}}\right)^{-6}$ **b.** $-1/(x-1)^0$ **c.** y^{2n} / y^{n-1}

8a. Solve for C: $F = (9/5)C + 32$

8b. Solve for f_2: $1/f = 1/f_1 + 1/f_2$

8c. Solve for L: $S = (a-rL)/(L-r)$

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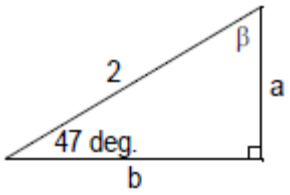
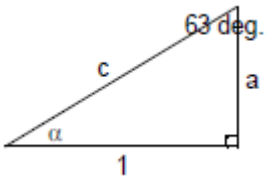
REVIEW PROBLEMS:, *continued*

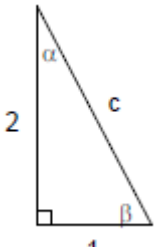
9. Find the values of *b* and β



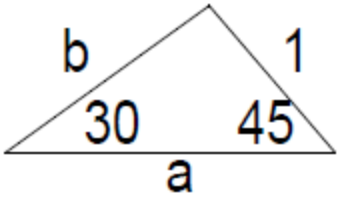
10. Find the values of α, *a*, and *c*.



11. Find the values of α, β, and *c*.



12. Find the values of *b* and *a*.



13. Show that $\sin^2(x) + \cos^2(x) = 1$ for any value of *x*.

14. When exercising Mary walks a distance to warm up, jogs 7/5 times as far as she walks and runs 10/3 times as far as she jogs. If she covers 3000 meters, find the distance that she walked, jogged, and ran.

15. Find the equation of the straight line that runs through the points (1, 2) and (5, 4).

16. Find the equation of the line that runs through (0,0) and is perpendicular to the line in Problem 15.

17. Solve for the value of *x* if $x = \log_3(71)$, i.e. $3^x = 71$.

18. Harry paid $178.97 for a suit that had been marked down twice: first by 15% of the original price and then by 8% of the second price. What was the original price of the suit?

19. Find four consecutive numbers such that the sum of the first and the fourth is 245.