Prerequisite Review
MATH 1316 – Trigonometry

In MATH 1316, the student learns how to work with trigonometric functions, identities, equations, and applications of all of these. Students who wish to take scientific calculus must learn the material in MATH 1316 and MATH 2412 (Precalculus) to prepare for MATH 2413 (Calculus I). To begin the trigonometry course, it is necessary that you have completed the prerequisite for the course (one semester of high school trigonometry or precalculus, or College Algebra or the equivalent) and that you recall most of the high school geometry and algebraic techniques you have already studied. There is little or no review of algebra or geometry in the trigonometry course.

The following problems provide a review of this algebra for students who have completed the prerequisite. The answers are listed at the end. If you find any of these that you do not know how to do correctly, you need to do one of two things before you enroll in MATH 1316:

1. Get an algebra book (at the Intermediate Algebra or College Algebra level) and review these topics until you can do all of these problems. If you do not have a book, you may check one out of a library, buy a non-current textbook at a used book store, buy an algebra revised book such as the Schaum's Outline Series, or buy a current textbook.

2. If you are unable (or don't have time) to learn these topics by reviewing on your own, you need to take an algebra course to refresh your algebra skills.

Review Problems

1. A ladder is leaning up against the side of a house. If the bottom of the ladder is 7 feet from the house and the ladder is 14 feet long, how far up the side of the house is the top of the ladder?

2. At a certain time of day, the length of the shadow cast by a building is 50 feet. At the same time, a 4 foot long stake casts a shadow that is 3.5 feet long. How tall is the building, rounded to the nearest hundredth of a foot?

3. Find the distance between the two points: (–1, 4) and (3, 12).

4. Find the slope-intercept form of the equation of the line through the points (–3,2) and (5,1).

In Problems 5-12, solve for *x*.

5. $2x-(3-x)=5+6x$

6. $2x^2=15-x$

7. $2x^2+x=16$

8. $x^6=8-2x^3$

9. $p=33(20-6x)$

10. $5x-7a=bx+2$

11. $2x^2+h=2k$

12. $2x^3+7x^2-18x-63=0$

13. Divide and simplify: $\dfrac{2x-10}{16-x^4}\div\dfrac{4x^2-16x-20}{x^2+4x+4}$

14. Simplify: $\dfrac{(a-b)^2}{\frac{1}{a}-\frac{1}{b}}$

15. $\dfrac{2}{x}=\dfrac{3}{x-2}-1$

16. $\dfrac{x+4}{x+3}+2=\dfrac{1}{x+3}$

17. Solve for r: $\dfrac{A}{a}=\dfrac{R+r}{r}$

In 18 and 19, tell whether each system has no solution, exactly one solution, or infinitely many solutions. If the system has exactly one solution, solve it.

18. $\begin{cases}9x-3y=-1\\3x+6y=-5\end{cases}$

19. $\begin{cases}x-y=1\\-2x+2y=5\end{cases}$

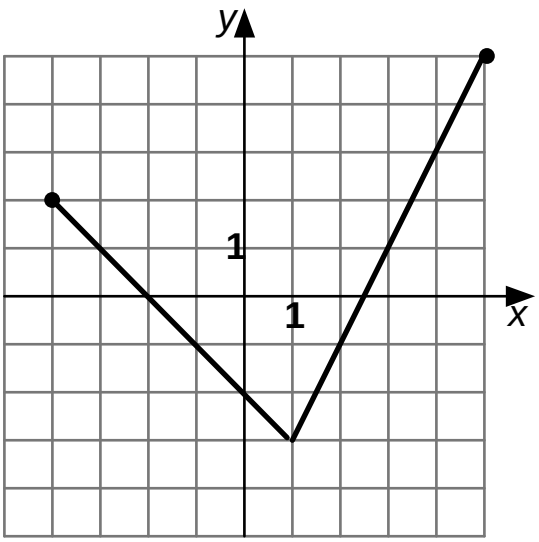
20. Give the standard form of the equation of a circle with ends of a diameter at $(-5,8)$ and $(1,-2)$.

21. Graph $x^2 + y^2 - 6x + 4y + 12 = 0$.

22. For the function $f(x) = 3x^2 - x + 5$, (a) find $f(-2)$ and (b) find $f(r+s)$.

23. Give the domain of $f(x) = \dfrac{x^2 - 5x + 6}{x^2 - 2x - 15}$.

24. The graph of the function f is shown at the right.



(a) What is the domain of f?

(b) What is the range of f?

(c) Determine $f(3)$.

(d) For what value(s) of x does $f(x) = 1$?

(e) Is f an even function, an odd function, or neither?

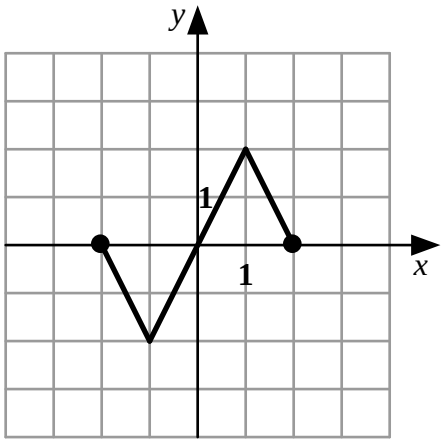
(f) Is f a one-to-one function?

(g) Does f have an inverse function?

25. For $f(x) = x^2 + x - 2$, (a) give the x-intercept(s), (b) give the y-intercept(s), and (c) give the vertex, and (d) draw the graph.

26. How does the graph of $y = f(x-3) + 4$ compare to the graph of $y = f(x)$?

27. The graph of $y = g(x)$ is shown at the right. On the same coordinate system draw the graph of $y = -g(2x)$.



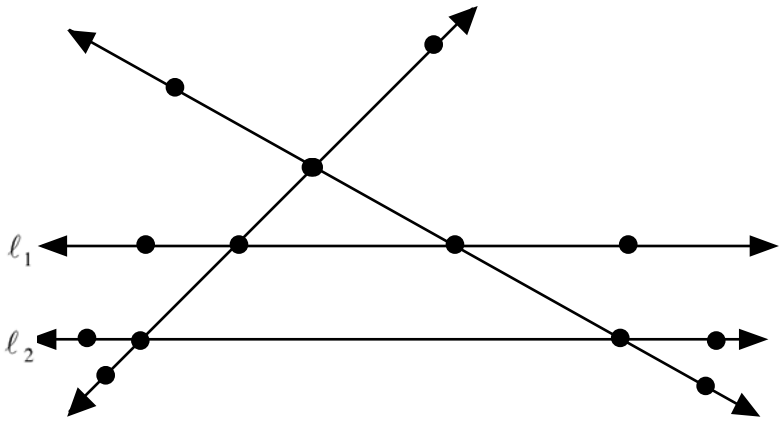
28. Suppose that the domain of the function f is $[-3,5]$ and that the range of f is $[-1,7]$. (a) What is the domain of f^{-1}? (b) What is the range of f^{-1}?

29. Give the inverse function for $f(x) = \dfrac{2x - 3}{4}$.

30. Is the triangle whose sides measure 6 yd, 10 yd, and $4\sqrt{33}$ yd a right triangle?

31. In the figure at the right, lines l_1 and l_2 are parallel. The measure of $\angle DEC$ is 140° and the measure of $\angle GFC$ is 145°.

Find the measures of (a) $\angle ACB$, (b) $\angle FJK$, and $\angle HIL$.



Topics and Answers

1. Pythagorean theorem: height is $\sqrt{147}$ ft

2. Similar triangles: 57.14 ft

3. Distance formula: $4\sqrt{5}$

4. Equations of lines: $y = -\frac{1}{8}x + \frac{13}{8}$

5. Linear equations: $x = -\frac{8}{3}$

6. Quadratic equations (factorable): $\left\{-3, \frac{5}{2}\right\}$

7. Quadratic equations (quadratic formula): $x = \frac{-1 \pm \sqrt{129}}{4}$

8. Equation quadratic in form: $\left\{-\sqrt[3]{4}, \sqrt[3]{2}\right\}$

9. Formulas or literal equations (linear): $x = \frac{10}{3} - \frac{1}{198}p$

10. Formulas or literal equations (linear): $x = \frac{2+7a}{5-b}$

11. Formulas or literal equations (quadratic): $x = \pm\frac{\sqrt{4k-2h}}{2}$

12. Polynomial equation (factorable by grouping): $\left\{\pm 3, -\frac{7}{2}\right\}$

13. Division of rational expressions and factoring: $\frac{x+2}{2(x+1)(x^2+4)(2-x)}$

14. Complex fractions and rational expressions: $-ab(a-b)$

15. Rational equations: $\{-1, 4\}$

16. Rational equations: No solution. –3 is an extraneous solution; it is not a useable solution because it results in division by zero in the original equation.

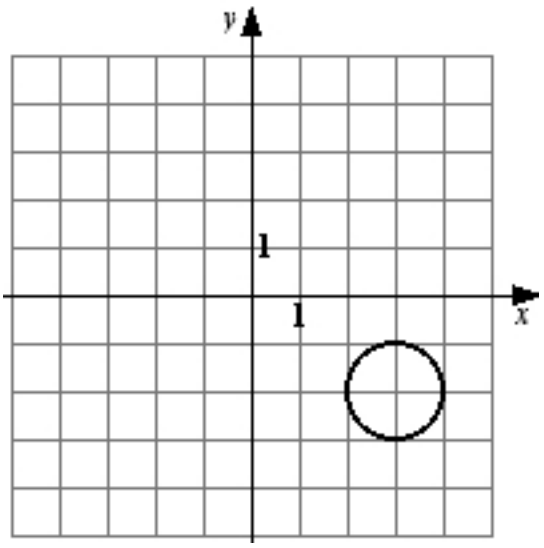
17. Formulas or literal equations (rational): $r = \frac{aR}{A-a}$

18. Systems of equations: $\left(-\frac{1}{3}, -\frac{2}{3}\right)$

19. Systems of equations: No solution

20. Equations of circles: $(x+2)^2 + (y-3)^2 = 34$

21. Graphing circles: The equation can be put in the standard form $(x-3)^2+(y+2)^2=1$ so the graph is a circle with center at (3,–2) and with a radius of 1.



22. Function notation: (a) 19 and (b) $3r^2+6rs+3s^2-r-s+5$

23. Functions (domain): $\{x|x \text{ is a real number and } x \neq -3,5\}$

24. Functions (properties of): (a) [–4,5], (b) [–3,5], (c) 1, (d) –3, 3 (e) neither, (f) no (g) no

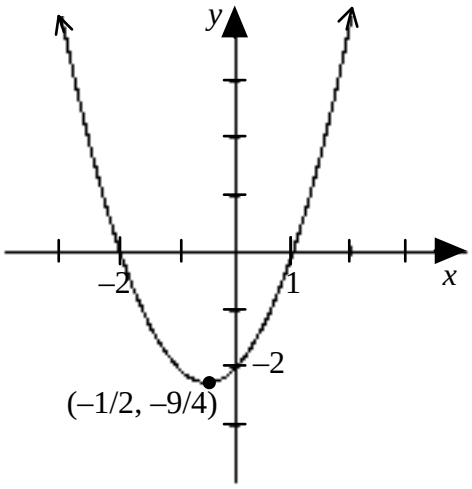
25. Quadratic functions (graphing):

(a) (–2,0) and (1,0)

(b) (0,–2)

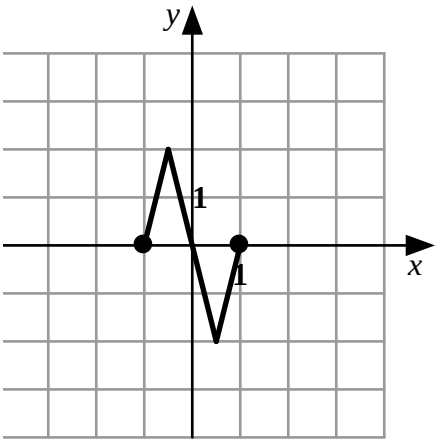
(c) $\left(-\frac{1}{2},-\frac{9}{4}\right)$

(d) The graph is the open up parabola shown at the right.



26. It is translated (shifted) right 3 units and up 4 units.

27.



28. (a) [–1,7], (b) [–3,5]

29. $f^{-1}(x)=\frac{4x+3}{2}$

30. Pythagorean theorem: No. If the triangle were a right triangle, the longest side, $4\sqrt{33}$, would have to be the hypotenuse. Therefore the sum of the squares of the other two sides would have to equal the square of $4\sqrt{33}$, which is not the case.

31. (a) 105°, (b) 145°, (c) 40°