

Accelerated Math 3

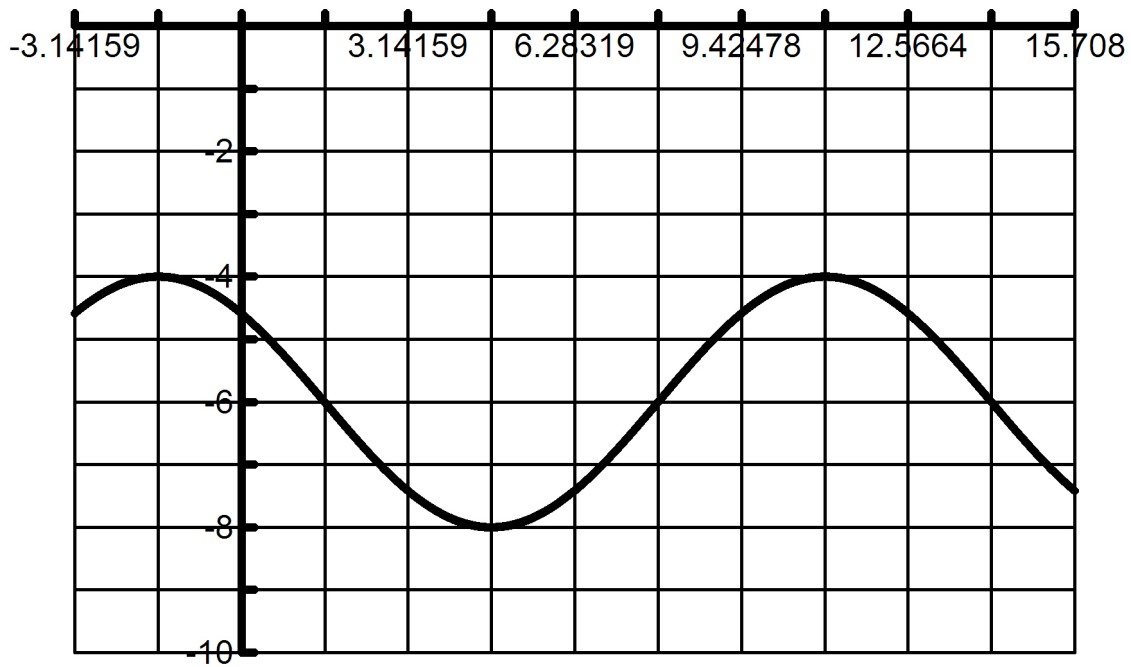
Topics and Suggested Review Problems – Test 2

Test 2 is cumulative – meaning that Test #1 will serve as a good review for about 50% of this test. I won't ask you the same questions. But the concepts and material is the same. Any of the Test 1 material that appears on this review sheet will be especially important.

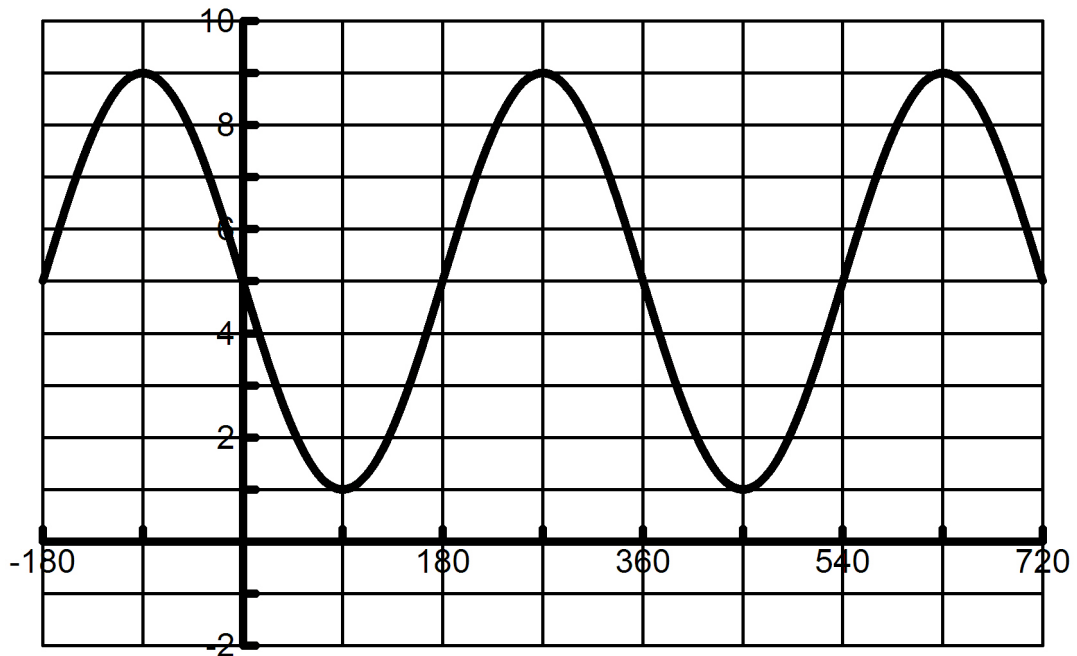
- Fox population problem.** Naturalists find that the populations of some kinds of predatory animals vary periodically. Assume that the population of foxes in a certain forest varies sinusoidally with time. Records started being kept at $t = 0$ years. A minimum number, 200 foxes, occurred when $t = 2.9$ years. The next maximum of 800 foxes occurred at $t = 5.1$ years.
 - Sketch a graph of this sinusoid.
 - Write an equation expressing the number of foxes as a function of time, t .
 - Predict the fox population at $t = 7$ years.
 - Foxes are declared an endangered species when the population drops below 300. Between what two nonnegative values of t were foxes first endangered?
- Know the table that I gave you with the characteristics of all six trig functions in both radians and degrees. For example, what is the period in degrees and radians of $\sin(x)$ and $\cos(x)$? What is the range of $\sin(x)$ and $\cos(x)$? What is the period of $\tan(x)$, $\cot(x)$, $\sec(x)$, and $\csc(x)$? Where does $\sec(x)$ have vertical asymptotes and why? What is the range of $\sec(x)$ and why? What is the domain of $\sec(x)$? Why?
- Plot by hand (and check with your calculator): $y = 3 - 2 \sin 4(x - \pi)$
- Plot by hand (and check with your calculator): $y = -3 + 6 \cos 12(\theta + 40^\circ)$
- Name all of the important characteristics of the following rational function (vertical and horizontal asymptotes, x - and y -intercepts, end behavior):
$$f(x) = \frac{2x - b}{(x + a)(2x - a)}$$
- Give **exact** values for all six trig functions for an angle whose terminal side contains $(-6, 12)$.
- Solve $x = \arccos(-0.3)$ algebraically. What is the first non-negative answer for x ? What are the first 4 non-positive answers for x ? Sketch a graph of your solution.
- Name the first four positive values of x for which $y = 2 \cos 3(x - \pi) - 1$ cross the x -axis. You should be able to produce your answer algebraically and with the calculator. You should also be able to graph what your answer means.
- Write the equation of a sinusoid that has a maximum of 10 at $x = 5$ and the next minimum of -4 at $x = 10$.
- Tarzan problem.** Tarzan is swinging back and forth on his grapevine. As he swings, he goes back and forth across the riverbank going alternately over land and water. Jane decides to model mathematically his motion and starts her stopwatch. Let t be the number of seconds on the stopwatch, and y be the number of meters Tarzan is from the riverbank. Assume that y varies sinusoidally with t and that y is positive when Tarzan is over water and negative when he is over land. Jane finds that when $t = 2$, Tarzan is at one end of his swing, where $y = -23$ meters. She finds that when $t = 5$, he reaches the other end of his swing and $y = 17$.
 - Sketch a graph of this sinusoid.
 - Write an equation expressing Tarzan's distance from the riverbank in terms of t .
 - Predict y when i) $t = 2.8$, ii) $t = 6.3$, iii) $t = 15$
 - Where was Tarzan when Jane started her stopwatch?
 - Find the least positive value of t for which Tarzan is directly over the riverbank ($y = 0$).

Accelerated Math 3 – Topics and Suggested Review Problems – Test 2 continued

11. Write an equation for the following graph.



12. Write an equation for the following graph.



13. Simplify the following expression. Write your final answer in the simplest possible form.

$$\frac{8x}{5x - x^2} + \frac{120}{x^2 + 5x - 50}$$