Pre-Calculus Homework #13

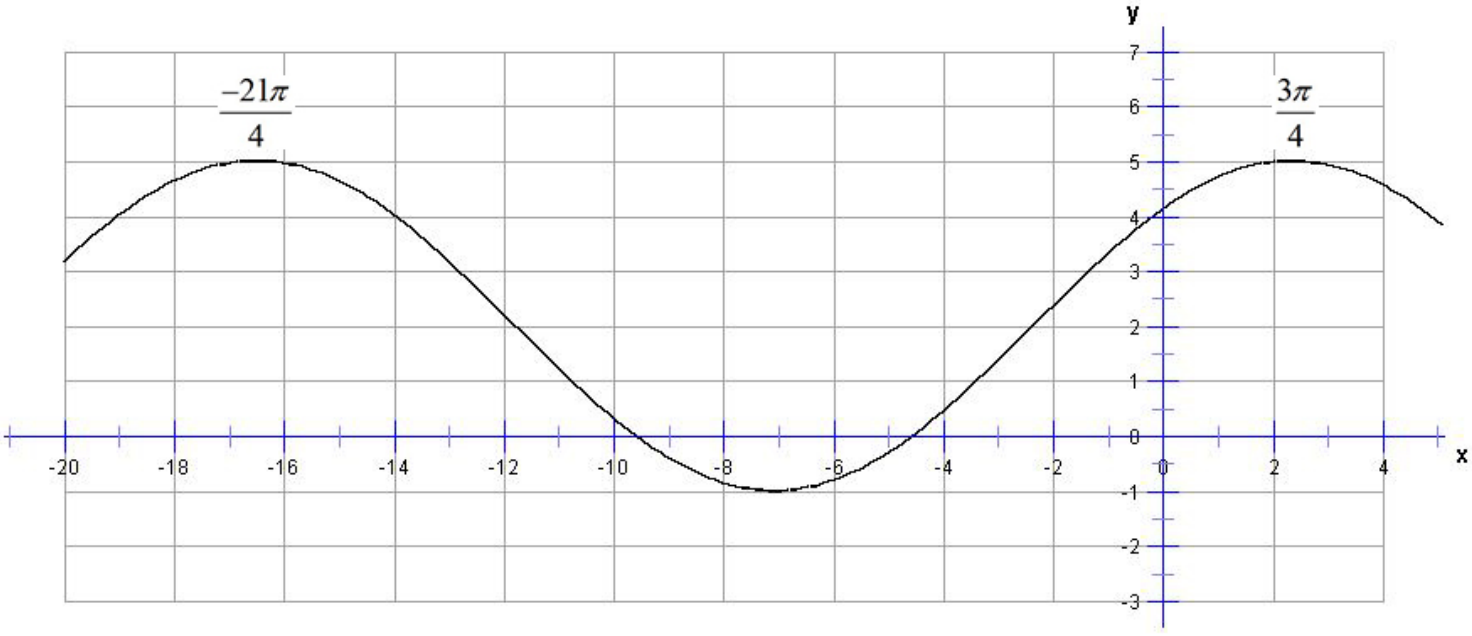
1) An airplane leaves an airport and flies due north. After flying for 340 miles, the plane turns and flies due west until an emergency forces it to change course and fly directly back to the airport. If, when the emergency happened, the plane changed its heading to $127^{o}48'13.5"$ and flew straight back to the airport, how far away (in miles rounded to one decimal place) was the plane from the airport when the emergency happened and how far did it fly west before the emergency occurred?

2) If $y = -4\sin(3x + \pi) - 2$, determine if the graph is inverted, find the amplitude, period, phase shift, vertical shift and graph the function based on these answers and your knowledge of the sine function.

3) If the distance between the earth and the sun is approximately 92,955,807 miles, what is the linear velocity (in miles per hour rounded to one decimal place) of the earth as it travels around the sun?

4) A helicopter is used to determine the distance between two forest fires burning in a remote section of a national park. The helicopter is flying at an altitude of 5382 feet and both fires can be seen directly in front of the pilot. If the angle of depression to the closest fire is 49 degrees and the angle of depression to the furthest fire is 12 degrees, how far apart (in miles rounded to one decimal place) are the fires and, if the helicopter went straight down and landed on the ground, how far would it be from the furthest fire?

5) Use the following graph to determine the type of trigonometric function involved, the amplitude, period, phase shift, vertical shift of this function and then use this information to write the equation of this function in standard form.



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6) Emily is interested in buying a triangular piece of property to build a house. She needs to provide the mortgage company with the dimensions of the property and the area (in acres) in order to qualify for a loan to buy the property. The property is so overgrown that it is impossible to walk through it or around it so she can't measure anything directly but Emily has some information from an old survey. She knows that one side of her property, the side on the road, is exactly 734.6 feet long. She also knows that the angle the left side of her property makes when it hits the road side is exactly $82^{o}40'12"$ and that the angle the right side makes when it hits the road side is exactly $78^{o}27'36"$. Given this information, and the knowledge that 1 acre = 43,560 square feet, determine the lengths of the two missing sides of Emily's property and calculate the area in acres (round all answers to one decimal place).

7) If angle A = $129^{o}32'9.6"$, angle C = $18^{o}28'4.8"$, and side b = 946, solve all possible triangles and find the area of each. Give all angles in degrees, minutes, and seconds rounded to the nearest tenth of a second and round all sides and the areas to one decimal place.

8) An airplane leaves Philadelphia International Airport and flies at a heading of 74^{o} out over the Atlantic Ocean. An engine malfunction forces the plane to change its heading to 276^{o} so it can attempt to land at Newark International Airport. If Newark Airport is $N47^{o}E$ of Philadelphia Airport and the two airports are exactly 79 miles away from each other, how far did the plane fly before landing at Newark? (round your answer to one decimal place)

9) If side a = 13, side c = 21, and side b = 15, solve all possible triangles and find the area of each. Give all angles in degrees, minutes, and seconds rounded to the nearest tenth of a second and round all sides and the areas to one decimal place.

10) A cargo ship is damaged and blown off course by a major hurricane. They must try to determine how far away they are from the closest port, which they assume is Bermuda, and all they know for certain is this: the ship is $S68^{o}E$ of Washington, DC, it is $N8^{o}E$ of Bermuda, Bermuda is $S48^{o}E$ of Washington, DC, and Washington, DC and Bermuda are exactly 829 miles apart. How far is the ship from Bermuda? (round your answer to one decimal place)

11) If side a = 25, angle A = 35.6^{o}, and side b = 33, solve all possible triangles and find the area of each. Round all angles, sides, and areas to one decimal place.

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12) A commercial airliner goes missing over the Pacific Ocean and an immediate search and rescue effort begins. Three navy ships, a patrol boat, a cruiser, and a destroyer happen to be in the area and their locations mark the vertices of the triangular area to be searched. The destroyer is at a bearing of $S72^{o}E$ from the cruiser and is exactly 837 miles away from the cruiser. If the patrol boat is at a bearing of $N18^{o}W$ from the destroyer and the cruiser is at a bearing of $S53^{o}W$ from the patrol boat, how far is the patrol boat from the cruiser, how far is the destroyer from the patrol boat, and how large is the search area in square miles? (round all answers to one decimal place)

13) If side b = 11.6, angle A = 54.9^{o}, and side c = 18.4, solve all possible triangles and find the area of each. Round all angles, sides, and areas to one decimal place.

14) Two ships leave the same port at the same time. One ship sails off at a speed of 14 miles per hour at a bearing of $N23^{o}W$ from the port while the other ship sails off at a speed of 11 miles per hour at a bearing of $S9^{o}W$ from the port. How far will the ships be from one another after 8 hours? (round your answer to one decimal place)

15) If side c = 47.3, angle B = 116^{o}, and side b = 24.7, solve all possible triangles and find the area of each. Round all angles, sides, and areas to one decimal place.

16) Phoebe decides to take a hike in a national park to a remote camp, deep in the woods. Her map says that she must leave the visitor's center and walk for 38 miles at a bearing of $N27^{o}E$ but, in a rush to get going, she misread the map and thought it said travel at a bearing of $N27^{o}W$. Not realizing her mistake, she hikes for 7 hours at an average rate of 3 miles per hour. At that point, she stops to take a break and reexamines the map. She immediately realizes her error and knows just how lost she must be but she remains calm because she knows trigonometry! She breaks out a pencil and paper and calculates the rest of her hike. How far is Phoebe from the camp and what should her bearing be, from her present location, to get to the camp? (round all answers to one decimal place)

17) If side a = 26.4, side c = 18.7, and side b = 7.6, solve all possible triangles and find the area of each. Give all angles in degrees, minutes, and seconds rounded to the nearest tenth of a second and round all sides and the areas to one decimal place.

18) Two airplanes leave the same airport at the same time on different runways. One plane flies with a heading of 216^{o} at a speed of 324 miles per hour while the other plane flies with a heading of 283^{o} at a speed of 276 miles per hour. After 4 hours, how far are the planes away from each other? (round your answer to one decimal place)

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19) If angle B = $111^{o}37'12"$, angle C = $7^{o}16'48"$, and side c = 34.2, solve all possible triangles and find the area of each. Give all angles in degrees, minutes, and seconds rounded to the nearest second and round all sides and the areas to one decimal place.

20) Two fire towers provide forest fire alert coverage for an entire national forest. A park ranger in fire tower A spots a forest fire at a heading of 57^{o} from his location. At the same time, a park ranger in fire tower B spots the same forest fire at a heading of 351^{o}. If tower B is $S71^{o}E$ from tower A, and the two towers are exactly 43 miles away from each other, how far is the fire from tower A? How far is the fire from tower B? (round all answers to one decimal place)