MATH Chapter 6 Problems$_Silva Andrew$

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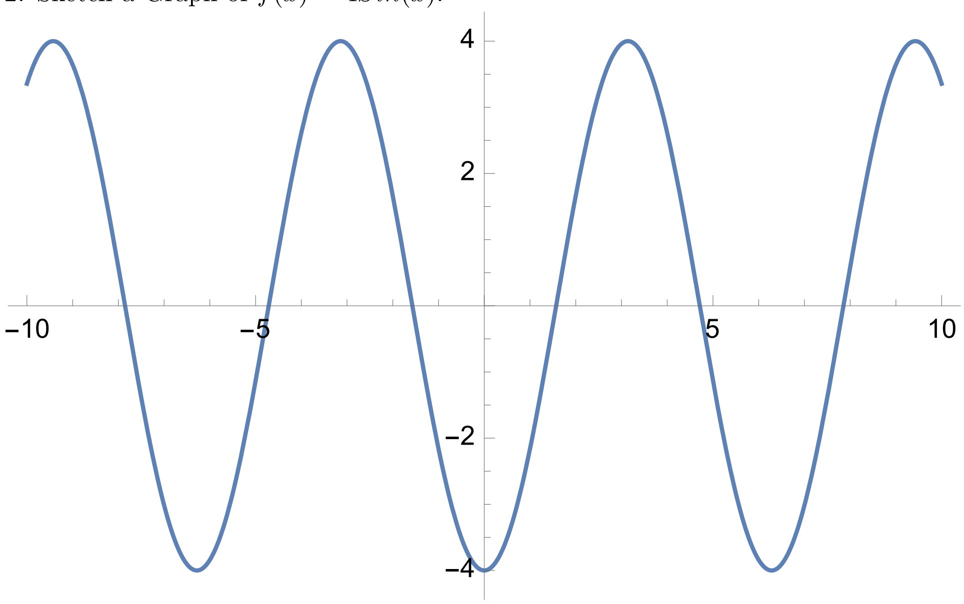
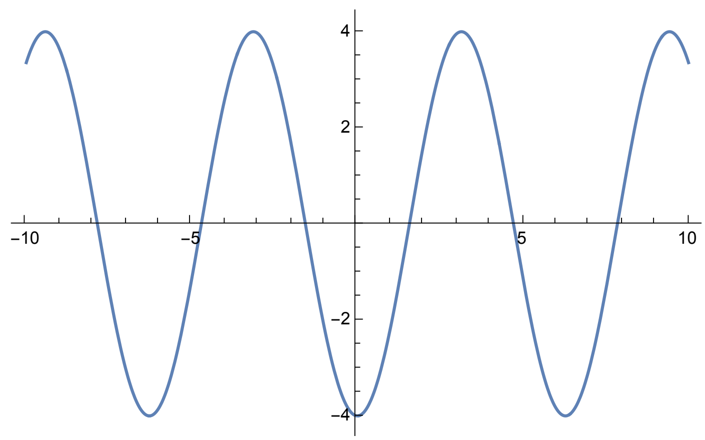
1 Sinusoidal Graphs

2. Sketch a Graph of $f(x) = 4Sin(x)$.



After asking questions in class I realized I was using the wrong Operating system to use mathematica on. I thought it was not able to be run on Mac OS for some reason. However, I realized I was not adding the graphics package. I tried it before but I was adding it incorrectly, as well as I was not able to save my graphs as the correct file. I tried my best to ask questions in class and research ways to figure it out on my own. It may have taken me the whole semester but I was able to figure it out.

4. Sketch a graph of $f(x) = -4cos(x)$.



4
2
-2
-4
-10
-5
5
10

Like the last one, it took me all semester to figure this out. I don't know why, I am usually good with technology, but this was just confusing me. Looking back it makes sense that I wasn't able to figure it out seeing that I was using the wrong OS. I just don't know why I thought mathematica was only able to be used through Windows. I still do not know how to scale the pdf so I do not know why this one take up a whole page.

12. Find Amplitude, Period, Mid Line, and Horizontal Shift of $y = 4sin(\frac{\pi}{2}(x - 3)) + 7$.
Amplitude = Asin = 4sin so, amplitude = 4.
Period = $\frac{2\pi}{B}$ and B = Bx so, B = 1 so, $\frac{2\pi}{1} = 2\pi$
Horizontal Shift - x+c so, HS = 3 units to the right
Mid Line = 7

I found this one easy. It just understanding the function and which part related to the amp, period, mid line, and Horizontal shift, and plug in the information given into the equations if needed or else the function gives the them already. At that point its just remember which parts is which.

14. Find Amplitude, Period, Mid Line, and Horizontal Shift of $y = 5sin(5x + 20) - 2$.
Amplitude = 5sin so, Amplitude = 5
Period = $\frac{2\pi}{5} = \frac{2\pi}{5}$
Horizontal Shift = 20 units to the left
Mid Line = -2

After doing the last one I was much more confident in doing this one. I didn't have a problem with the last one, but re doing another one definitely re enforced my understanding of the function and it's parts.

21. Amplitude = $\frac{57-43}{2} = \frac{14}{2} = 7$
Mid Line = 50
So, $D(t) = 50 - 7sin(\frac{2\pi}{24})$ so, $D(t) = 50 - 7sin(\frac{\pi}{12})$

I had to look the solution up for this one. I understood that we had to find the amplitude, mid line, and period before finding the function. I understood how to find the amplitude and What the mid line was but I was confused on how to find it. I was also confused on what the period was. Once I looked at the solution I had to think about why the period was $\frac{2\pi}{24}$, but it makes sense now. Because there are two sets of 12 which are day and night cycles of the 24 hours of the day. Another thing that confused me for a second was there not being a horizontal shifts.

22. Amplitude = $\frac{80-56}{2} = \frac{24}{2} = 12$
Mid Line = $\frac{80+56}{2} = \frac{136}{2} = 68$

$D(t) = 68 - 12sin(\frac{2\pi}{24}t) = D(t) = 68 - 12sin(\frac{\pi}{12}t)$

After doing the last one, I had a better understanding of this one. I noticed there wasn't anything mentioned about a horizontal shift in the problem so I wasn't confused about that part. I also figured it should be the same period as the last because it is two sets of 12 for day and night of the 24 hour day.

2 Graphs of the Other Trig Functions

6. Find the Period and Horizontal Shift of $g(x) = 3tan(6x + 42)$.
Period of a tan function is only π so it is $\frac{\pi}{6}$ with a horizontal shift to the Left 42 units.

I took me a minute to figure this one out. It took me a minute to realize the period of tan was π. I thought it was the same as sin, being 2π. I also had to look up the solution to realize I needed to divide the 42 by the b to find the horizontal shift.

9. Find the Period and Horizontal Shift of $m(x) = 6csc(\frac{\pi}{3}x + \pi)$.
Period $= \frac{2\pi}{\frac{\pi}{3}} = \frac{6\pi}{\pi} = 6$
Horizontal Shift = 3

After completing the last one I thought I had an strong understanding of this type of question. I figured out the period on my own, however for the Horizontal shift I guessed $\frac{\pi}{3}$, but when I checked it with the solutions I realized I was incorrect. I thought I understood how to find the HS in the problem, but I figured it wasn't just π so I guessed $\frac{\pi}{3}$.

16. Sketch a graph of $p(t) = 2tan(t - \frac{\pi}{2}$.
The period of p(t) = π and it's domain is $\theta \neq \pi + k\frac{\pi}{z}$ I had to look up the solution for this one. I have $p(t) = 2tan(t - \frac{\pi}{2}$ written in mathematica but it wont graph correctly. I thought I understood how to type it into mathematica properly but I guess not. I also didn't know how to find the domain, but I tried my best to walk myself through using the solutions.

21. If tan(x) = -1.5, find tan(-x)
The Mirror of -1.5 is 1.5 so, tan(x) = 1.5
I found this one easy since the opposite of -x is x you just take away the - from x to get -x.

26. If csc(x) = 2, find csc(-x)
The mirror of 2 is -2 so, csc(-x) = -2

Similar to the last one it is just finding the opposite for what is given. We also went over one of these in class which also helped my understanding with the type of problem.

27. Simplify cot(-x)cos(-x)+sin(-x) completely.
cot(-x)cos(-x)+sin(-x)
$= \frac{1}{tan(x)} cos(x) - sin(x)$
$= \frac{cos(-x)cos(x)}{sin(-x)} - sin(x)$
$= -(\frac{cos(x)cos(x)-sin(x)}{sin(x)})$
$= -(\frac{cos^2(x)+sin^2(x)}{sin(x)})$
$= -\frac{1}{sin(x)} = -csc(x)$

I found this one challenging at first but after asking questions during class I was able to figure it out and understand what it was asking. I was confused how we would simplify the equation without any numbers. But then I realized you used inverse properties of Trig functions to simplify it to one trig function.

3 Inverse Trig Functions

2. Evaluate $Sin^{-1}(\frac{\sqrt{3}}{2}$, giving answer in radians.
$= \frac{\pi}{3}$

At first I was really confused how to solve it. I thought the math was going to be too complicated so I was only creating my own confusion. Once I realized to use a trig calculator to solve the equation it made the stress go away and I was able to figure the problem out on my own.

4. Evaluate $tan^{-1}(-1)$, giving answer in radians.
$= -\frac{\pi}{4}$

After doing the last one, knowing to use a trig calculator made me not confuse myself and over think. This made it so I could figure out the solution quickly and accurate.

19. Evaluate the expression $sin^{-1}(cos(\frac{\pi}{4})$
$= sin^{-1}(\frac{-\sqrt{2}}{2}$
We're looking for an angle in $(\frac{\pi}{2}, \frac{\pi}{2}$ with a sine value of $\frac{\sqrt{2}}{2} = \frac{\pi}{4}$.
So, $sin^{-1}(cos(\frac{\pi}{4})) = sin^{-1}(\frac{\sqrt{2}}{2}) = \frac{\pi}{4}$

I had too look up the solution for this one. I was confused as first if I was able to use the Trig calculator to solve this one because it was made up of two trig functions. After looking at the solution I realized I definitely could use the Trig calculator to solve problems like these.

20. Evaluate the expression $cos^{-1}(sin(\frac{\pi}{6})$
$= \frac{\pi}{3}$

After doing the last one, I realized the trig calculator can be used to solve problems like these. After using the trig calculator it made it much easier and stress relieving to know the trig calculator can do a lot more then I thought. Understanding when to use the trig calculator is probably what I am going to struggle with most.

4 Solving Trig Equations

1. Find all solutions on the interval $0 < \theta < 2\pi$ for $2sin(\theta) = -\sqrt{2}$.
$sin(\theta) = -\frac{\sqrt{2}}{2}$
$\theta = \frac{5\pi}{4} + 2k\pi$ or $\theta\pi - \frac{\pi}{4} + 2k\pi = \frac{7\pi}{4} + 2k\pi$, for $k \in Z$
So, for $0 < \theta < 2\pi$, the answers are $\theta = \frac{5\pi}{4}$ and $\theta = \frac{7\pi}{4}$

For this one I had too look up the solution for it. I understood to divide by 2, but I was confused what the K was, but then I quickly realized it was the place holder for the horizontal shift.

4. Find all solutions on the interval $0 < \theta < 2\pi$ for $2cos(\theta) = -\sqrt{2}$
$cos(\theta) = -\frac{\sqrt{2}}{2}$
$\theta = \frac{3\pi}{4} + 2k\pi, \theta = \frac{5\pi}{4} + 2k\pi$
Answers $= = \frac{3\pi}{4}$ and $\theta = \frac{5\pi}{4}$

After looking up the solution to the last one I realized you could use a trig calculator to solve it, which made this one much easier to complete. As well as understanding what the k was helped me from confusing myself with what I needed to do next.

10. Find all solutions for $2cos(\theta) = -1$
$cos(\theta) = \frac{-1}{2}$
$\theta = \frac{2\pi}{3} + 2K\pi$ and $\theta = \frac{4\pi}{3} + 2k\pi$

I found this one very similar to last few. So I tried using a trig calculator and I seemed to find the answer. I didn't second guess my self and just did what looked familiar, second guessing my self is what makes me confused a lot of the time. I need to learn to just start the problem rather then just second guess how to start it.

12. Find all solutions for $2sin(\theta) = -\sqrt{3}$.
$sin(\theta) = \frac{-\sqrt{3}}{2}$
$\theta = \frac{4\pi}{3} + 2k\pi$ and $\theta = \frac{5\pi}{3} + 2k\pi$

Similar to the last one I used a trig calculator to solve it. The more problems I just do and the less I stop to think about all the possibilities on how to start it, the more I am going to re enforce the action of not second guessing myself. Which will hopefully clear a lot of the common confusions I have.

14. Find all the solutions for $2sin(2) = \sqrt{3}$.
$sin(2\theta) = \frac{\sqrt{3}}{2}$
General Solutions $= 2\theta = \frac{\pi}{3} + 2k\pi$ and $2\theta = \frac{2\pi}{3} + 2k\pi$
Solved $= \theta = \frac{\pi}{6} + k\pi$ and $\theta = \frac{\pi}{3} + k\pi$

I solved this one on my own, I figured it was similar to the last few as well. So I used a Trig Calculator and saw that there was four answers given. So I figured it wanted all of them. I checked with the solutions and I was correct.

16. Find all the solutions for $2sin(3) = -1$.
$sin(3\theta) = \frac{-1}{2}$
General Solutions $= 3\theta = \frac{7\pi}{6} + 2k\pi$ and $3\theta = \frac{11\pi}{6} + 2k\pi$
Solutions $= \theta = \frac{7\pi}{18} + \frac{2k\pi}{3}$ and $\theta = \frac{11\pi}{18} + \frac{2k\pi}{3}$

Same as the last, Using the trig calculator helps so much. Not second guessing myself about what answers they were looking for saved me from having confusion and wasting time.

34. Find the first two positive solutions of $7sin(5x) = 6$.
$sin(5x) = \frac{6}{7}$
$5x = sin^{-1}(\frac{6}{7})$
$5x \approx 1.02969 + 2k\pi$ or $5x \approx \pi - 1.02969 + 2k\pi$
n = 0
$5x \approx 1.02969 = x = .2059$ or $5x \approx 2.1119 = x = .4224$
So, $x \approx .2059$ or $.4224$

I had to look up the solution for this one. The only thing that confused me was why we used the inverse of sin if its asking for the positive answers.

36. Find the first two positive solutions of $3cos(4x) = 2$.
$cos(4x) = \frac{2}{3}$
$4x = cos^{-1}(\frac{2}{3})$
$4x \approx 0.8411 + 2k\pi$ or $4x \approx \pi - 0.8411 + 2k\pi$
n = 0
$4x \approx 0.8411$ so, $x \approx .21028$
and $4x \approx 2.3005$ so, $x \approx .57512$

After looking up the solution to the last one, I was able to complete this one by walking my self through it. I'm still a bit confused why we used the inverse of cos if it's asking for the positive answers.

5 Modeling with Trigonometric Functions

2. Solve for the unknown sides and angles.
$c^2 = 7^2 + 3^2 = \sqrt{58}$
A = $tan^{-1}(\frac{3}{7} \approx 23.199$
B = $tan^{-1}(\frac{7}{3} \approx 66.801$

I found this one easy, it is just remembering to use the inverse of the function to find the angles, and use Pythagorean theorem to find the sides.

4. Solve for the unknown sides and angles.
$12^2 = a^2 + 100^2 = \sqrt{44}$
A = $cos^{-1}(\frac{10}{12} \approx 33.557$
B = $sin^{-1}(\frac{10}{12} \approx 56.443$

I chose this one because I wanted to re enforce my understanding on triangles that look different then the last. I had to remember SOH CAH TOA to remember which Trig function to use for the certain angles.

7. Amplitude = $\frac{63-37}{2} = 13$
Mid Line = $\frac{63+37}{2} = 50$
Horizontal Shift Factor = $\frac{2\pi}{24} = \frac{\pi}{12}$
Horizontal Shift = -5
Period = 24 hours
$D(t) = -13cos(\frac{\pi}{12}(t-5)) + 50$

After completing this one I check my answer with the solutions. I realized I was almost correct , the only parts I missed were I forgot to make the 13 negative and I used sin because it said it could be modeled as a sinusoidal function. I thought that was referring to use the Sin function. But now I see too use cos since they give us the starting time of the lowest value.

8. Amplitude = $\frac{92-78}{2} = 7$
Mid line = $\frac{92+78}{2} = 85$
Horizontal Shift Factor = $\frac{2\pi}{24}$
Horizontal Shift = -4
Period = 24 hours
D(t) = $-7cos(\frac{\pi}{12}(t-4) + 85$

After completing the last one, I wanted to complete a similar one to re enforce my understanding of why we used the cos, as well as why we made the amplitude negative. We used cos because it gave us the start of the when the lowest temp was so it was smart to use a cos function. When we used the cos function it made the amplitude negative.