

**Homework 2, HONS 280 (Physics of Sound and Music)**  
**Spring 2020**  
**Due Monday, January 13th, 2020 at Beginning of Class**

From our discussions on the first day of class, it became apparent that the background of students in this class is highly variable. Although the content for this course doesn't have to be overly mathematical, I have historically found that the amount of mathematical training retained from prior math classes can be surprising. This homework is just a quick assignment to see where you stand.

This homework is to (1) find out if there are any general holes in the class's mathematical knowledge, (2) to get our mental juices flowing after the winter break, and (3) to see if some of you have a level of mathematical preparation beyond what I normally would expect for this class.

**DO NOT USE EXTERNAL RESOURCES FOR THIS HOMEWORK. *YOU SHOULD NOT NEED A CALCULATOR OR ANY OTHER RESOURCES TO DO ANY OF THESE PROBLEMS! AS SUCH, YOU ARE ON YOUR HONOR TO NOT USE THEM – OR OTHER AIDS – TO DO THIS WORK.*** Also, though I normally encourage you to work with others on homework assignments, please do this one on your own.

It is entirely possible that you'll have never seen some of the materials I'm asking for here. That's ok; just write "I have no idea how to do this" or something similar for problems you can't do.

Please put your answers on a separate sheet of paper. Make sure everything is legible and well organized. This homework will be graded on effort only – so do your best and turn it in and you can get a good boost in your grade right away in the beginning of the semester.

1. List all Mathematics classes you've ever taken (High School and College).
2. Solve for  $x$ :  $6x + 7 = 55$
3. Solve for  $x$ :  $6(x + 7) = 54$
4. What is the value of  $\cos \pi$ ?
5. What is the value of  $\sin (60^\circ)$ ?
6. What is the value of  $\tan \left(\frac{\pi}{3}\right)$ ?
7. Simplify  $\sqrt{144a^2b^4c^7}$ .
8. Evaluate  $\sqrt[3]{-8}$
9. Evaluate  $16^{-1/2}$
10. A right triangle has a hypotenuse of length 25, and one of the other sides has length 24. What is the length of the remaining side?
11. Solve for  $x$ :  $5x^2 + 6x = -1$ .

12. Find  $x$  and  $y$  so that both of these equations are satisfied:

$$8x + 4y = 16$$

$$6x - 3y = 24$$

13. Evaluate:  $\sqrt{-121}$

14. What is  $\ln(e^{3\pi})$

15. Find  $\lim_{x \rightarrow 0} \left[ \frac{\sin^2(3x)}{(2x)^2} \right]$

16. Calculate:  $\frac{d}{dx}[3x^5]$

17. Integrate:  $\int x^2 dx$

18. Integrate:  $\int_0^{\pi/2} (\cos x) dx$

19. Calculate:  $\frac{\partial}{\partial z} \left[ \frac{4x^4}{y^3 z} \right]$

20. Integrate  $\int_0^1 x \exp(-x^2) dx$