

Homework Two

Precalculus: Functions, Geometry, Trigonometry, & Modelling
UCR Math-005-E01, Summer 2020

Please upload your responses to these prompts to Gradescope before 8am next Monday morning. That way I have time to read over them to prepare for the coming week.

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Exercises

1. If you haven't already, go read your feedback on the Writing question where $2 = 1$ on Homework One. Many of you didn't quite pick out *the* big issue with the argument from that prompt. Go rethink this one. There's a single mathematical misstep that the author makes. It's subtle, but it's definitely mathematically invalid. Go find it.
2. From the [University of Washington's Math120 book, page 116](#) (PDF page 136), work through the exercises 8.3 and 8.6.
3. Consider the functions

$$s_a(x) = ax \quad t_a(x) = x + a \quad f(x) = \frac{1}{x} \quad g(x) = x^3. \quad (\star)$$

Write each of the following functions as a composite of the functions above in (\star) .

$$h(x) = 7(x - 2)^3 + 3$$

$$i(x) = \frac{2}{\left(\frac{2}{x+2} + 2\right)^3 + 2}$$

Note that a and b in the functions are constants that you may choose. For example you can write the function $f(x) = 2x^3 - 1$ as $t_{-1} \circ s_2 \circ f$.

4. From the [University of Washington's Math120 book, page 130](#) (PDF page 150), work through the exercises 9.2 and 9.5 and 9.9.
5. Which of the following functions f have a unique inverse function f^{-1} where the domain of f^{-1} is all of the range of f ? For those functions, write the inverse function f^{-1} and the domain of f^{-1} . For the other functions, write at least two inverse functions f^{-1} and the largest connected subset of the range of f on which the domain of each can be defined.

$$f(x) = 3x - 2$$

$$g(x) = (x + 1)(x - 2)$$

$$h(x) = \frac{1}{x^2}$$

$$i(x) = -\sqrt{x}$$

6. From the [University of Washington's Math120 book, page 22](#) (PDF page 42), work through the exercises

2.1 2.3 2.4 2.5 2.8 2.10

7. Two rockets are fired from the surface of the earth at time $t = 0$ hours. Each rocket is propelled with enough force that the effects of air resistance and gravity are negligible. One rocket is fired from Seattle at coordinates $(0, 0, 0)$ and the other is fired from Riverside at coordinates $(50, -800, 0)$. The respective trajectories of the rockets are given by the vectors $\langle 1000, -57, 100 \rangle$ and $\langle 1000, 121, 200 \rangle$ per hour. How close are the rockets to each other after one hour?

8. From the [University of Washington's Math120 book, page 31](#) (PDF page 51), work through the exercises

3.1 3.2 3.4 3.7

9. From the [University of Washington's Math120 book, page 51](#) (PDF page 71), work through the exercises

4.1 4.6 4.9

Writing

1. I want you to revisit exercise #10 from Homework One about painting boxes. First, the correct answer to this question is

$$\frac{2}{3}10\sqrt[3]{25}\text{minutes.}$$

If that's not what you got, figure out why that's the correct number of minutes. (Probably talk to me or Jonathan) But then I want you to carefully write-up your response to this exercise. Explain your reasoning. Explain the computations you're doing. Like, write this up in such a way that someone who's just starting this class would understand completely how to respond to this exercise based on what you write. This is the only writing prompt this week; I'm expecting quite a bit from you on this one.

Reflection

Do you think you've understood the math for this homework? *Are you confident your responses are correct?* Tell me any deep insecurities that this math homework made you feel.

Is there anything you'd like me to look at more carefully in your Exercise and Writing responses? Like, is there anything in particular you'd like feedback on?