

Precalculus-04, Test 2 Review

Dr. Graham-Squire, Fall 2013

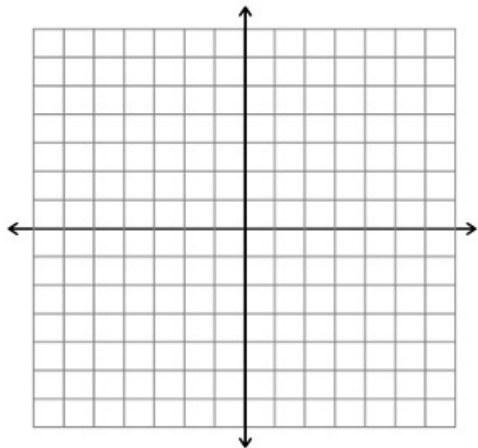
•The test will cover sections 2.5-2.7 and 3.1-3.7.

•To study, you can look over your notes, rework HW problems on WebAssign, quizzes, and problems from the notes, as well as work out the practice problems given for each section. The Review Questions at the end of Chapters 2 and 3 are also good practice. You can also look at the following problems on my website: Quiz 1, question 2; Test 1, question 2.

•Calculators are allowed on this test, but for certain questions you may not be allowed to use a calculator. For those without graphing calculators, there may be a section on the test where you can use either a calculator or a computer.

•Some practice problems to work on:

1. Starting with the graph of $y = \sqrt{x}$, shift, flip and/or stretch the graph to find the graph of $y = -\sqrt{x+3} - 1$.



2. Let $f(x) = \frac{1}{\sqrt{x}}$, $g(x) = x^3$, and $h(x) = x^2 + 2x + 3$. Find the composition of functions $g(h(f(x)))$. Simplify your answer if possible.
3. Graph each function to confirm that it is one-to-one. If it is not, restrict the domain so that it is one-to-one. Then find the inverse for each function.
 - (a) $f(x) = \frac{2-3x}{4+x}$
 - (b) $f(x) = \frac{1}{2}(x-7)^2 + 3$

4. The owner of a luxury motor yacht that sails among the Greek islands charges \$600/person if exactly 20 people sign up for the cruise (which gives a total revenue of $600 \cdot 20 = 12,000$ dollars) . However, if more than 20 people sign up (up to the maximum capacity of 90) for the cruise, then each fare is reduced by \$4 for each additional passenger. Thus if there are 21 people, the fare is \$596 per person for everyone, for a total revenue of $596 \cdot 21 = 12516$ dollars. If there are 22 people then the fare is \$592 per person, etc. Assuming at least 20 people sign up for the cruise, let x be the number of passengers over 20 who sign up for the cruise. Answer the following questions:

- (a) Construct a quadratic function $r(x)$ to represent the total revenue in terms of x .
- (b) Find the number of passengers that would give the *maximum* amount of revenue for the owner of the yacht.
- (c) What is the maximum revenue possible?
- (d) Explain how you could find (b) and (c) using a graph of $r(x)$, and how you would find them without using a graph.

5. Find the quotient and remainder for the division $\frac{x^5 - 2x^4 + x^3 - 3x + 1}{x^2 + 4x - 1}$

6. An open box with a volume of 1500 cm^3 is to be constructed by taking a piece of cardboard 20 cm by 40 cm, cutting squares of length x from each corner, and folding up the sides. Show that this can be done in two different ways and find the exact value of x in each case. Note that “exact” means that I do not just want a decimal approximation!

- (a) Draw a diagram of the situation. Start with a 20×40 rectangle, then show how the corners are cut out, then show how it is folded up into a box.
- (b) Write an equation (in terms of x) that represents the volume of box, and then move stuff to one side so that you have a polynomial equal to zero.
- (c) Use graphing and/or factoring techniques to find all the zeroes of the polynomial from part (b).

7. Find all zeroes for the following polynomials, both real and complex:

(a) $x^5 + 5x^3 - 36x$

(b) $x^5 - 2x^4 + x^3 - 8x^2 + 16x - 8$ (Hint: try factoring by grouping- You will have to group in a different manner than previous problems, though, possibly rearranging some of the terms).

8. (a) Find all x and y intercepts and all vertical and horizontal asymptotes for the rational function

$$f(x) = \frac{-2(x - 3)(x + 3)}{x(x + 5)(x - 2)}$$

- (b) Sketch the graph of $f(x)$.

