Math 1210-4

Notes of 9/18-19/17

Chapter 0-1 Review

• Since this is our first exam, here is a rendering of the front page. The font on the exam will be different.

Make sure you write your name here:

1 2 3 4 5 6 7 8

\[ \sqrt{3} \quad \frac{5}{5} \]

Total

Math 1210-4 Fall 2017 Exam 1
September 20, 2017

Instructions

1. This exam is closed books and notes, no electronic devices. Please turn off your cell phones!

2. Use these sheets to record your work and your results. Use the space provided, and the back of these pages if necessary. **Show all work.** Unless it’s obvious, indicate the problem each piece of work corresponds to, and for each problem indicate where to find the corresponding work.
3. Please note: **To avoid disruption and distraction I won’t be able to answer questions during the exam.** If you believe there is a mistake in one of the problems write down an appropriate note and if you are right you will receive generous credit.

4. The questions on this test are deliberately simple. You should not be rushed and have time to answer all questions carefully and check your answers. **Accuracy is more important than speed.** Don’t get stuck on one problem. If you can’t answer a question immediately go on and return to that question only after you have answered the others.

5. Simplify any algebraic expressions and reduce any fractions.

6. If you are done before the allotted time is up I recommend strongly that you stay and use the remaining time to check your answers.

7. All questions have equal weight.

8. When you are done hand in your exam, pick up an answer sheet, and leave the class room. Do not return to your seat.

9. **Write clearly, explain what you are doing**, and

   Box Your Answers

   • End of first page preview!
The exam will have 8 questions covering chapters 0 and 1 of our textbook.

The Subject

The following list is neither complete nor self contained. Rather it is meant to trigger your memory and activate your comprehension. If any of these points are not clear to you make sure you review the relevant material before the exam. You want to understand everything that’s indicated here but not everything will be covered by the exam.

• The language of the number system. Natural numbers, integers, rational numbers, real numbers. Nestedness of the number system.

• The language of arithmetic. Sum, difference, product, quotient, to add, subtract, divide, multiply.

• Logic, converse, negation, and contrapositive of a statement.

• Simplifying expressions.

• Solving equations, particularly quadratic equations.

• The Cartesian coordinate system. Axes, quadrants, distances.

• The graph of an equation.

• Functions, arithmetic combinations of functions, composition of functions.
• Graphs of functions.
• Symmetry, even functions, odd functions.
• Shifts of functions, interplay between algebra and geometry.
• Polynomials. Degree, leading coefficient, leading term, constant term, long division, synthetic division, constant, linear, quadratic, cubic, quartic, quintic.
• Trigonometry. Definition of sin, cos, and tan in terms of the unit circle. Trigonometry on a right triangle.
• Lines, their slopes and intercepts, finding a line given two pieces of information, finding the intersection of two lines.
• Limits.
  – Definition,
  – Properties,
  – Computation.
• Continuous functions.
• The intermediate value theorem.
\[ a x^2 + b x + c = 0 \]
\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ (x+r)^2 = x^2 + 2rx + r^2 \]
\[ (x-r)^2 = x^2 - 2rx + r^2 \]
\[ (x-r)(x+r) = x^2 - r^2 \]

\[ x^2 + 6x - 5 = 0 \]
\[ x^2 + 6x = 5 \]
\[ x^2 + 6x + 9 = 14 \]
\[ (x+3)^2 = 14 \]
\[ x+3 = \pm \sqrt{14} \]
\[ x = -3 \pm \sqrt{14} \]

\[ x^4 - 5x^2 + 6 = 0 \] \[ z = x^2 \]
\[ z^2 - 5z + 6 = 0 \]
\[ (z-2)(z-3) = 0 \]
\[ z = 2 \quad z = 3 \]
\[ x^2 = z = 2 \quad x^2 = z = 3 \]
\[ (x^2-2)(x^2-3) = 0 \]
\[ x^2 = 2 \quad x = \pm \sqrt{2} \quad x^2 = 3 \quad x = \pm \sqrt{3} \]
\[ x - 5\sqrt{x} + 6 = 0 \quad z = \sqrt{x} \]

\[ z^2 - 5z + 6 = 0 \]

\[ \sqrt{x} = z = 2 \quad x = 4 \quad 4 - 5\cdot 2 + 6 = 0 \checkmark \]

\[ z = 3 \quad x = 9 \quad 9 - 5\cdot 3 + 6 = 0 \checkmark \]

\[ \frac{1}{x - 1} + \frac{1}{x + 2} - 5 = 0 \]

\[ \frac{1}{x - 1}(x + 2) = (x - 1)(x + 2) \]

\[ x + 2 + x - 1 - 5(x - 1)(x + 2) = 0 \]

\[ 2x + 1 - 5(x^2 + x - 2) = 0 \]

\[ 2x + 1 - 5x^2 - 5x + 10 = 0 \]

\[ -5x^2 - 3x + 11 = 0 \]

\[ 5x^2 + 3x - 11 = 0 \]

\[ x = \frac{-3 \pm \sqrt{9 + 220}}{10} \]

\[ x = \frac{-3 \pm \sqrt{229}}{10} \]
\[
\lim_{h \to 0} \frac{1}{x+h} - \frac{1}{x} = \\
= \lim_{h \to 0} \frac{1}{x+h} \cdot \frac{1}{x} \cdot (x+h) \\
= \lim_{h \to 0} \frac{x - (x+h)}{h \cdot x(x+h)} \\
= \lim_{h \to 0} \frac{-h}{h \cdot x(x+h)} = \lim_{h \to 0} \frac{-1}{x(x+h)} \\
= \frac{1}{x^2}