Math 115 Exam I (“Midterm I”) Review

Your first Math 115 full period exam covers Chapters 1.1 – 1.5 of the text. Material covered on the exam will be in relation to the syllabus for the course.

Students enrolled in Math 115 should already have a high level of algebra skills. In this regard, this early material from the text should be a review of these essential algebra skills.

When preparing for the exam, students should not rely only on this review material. To best prepare students may want to review also any recitation quizzes and the applicable parts of the Chapter 1 practice test from the text book.

Note also that answers to the problems that follow are at the end of the packet.

Algebra Skills

1. Given $A = \{x \mid -3 < x \leq 7\}$, $B = \{x \mid x \geq 5\}$, $C = \{x \mid x > 10\}$ find the following and express your answer using interval notation.
   a) $A \cap B$
   b) $A \cup C$
   c) $A \cap C$

2. Perform the indicated operations, expressing your answer in simplest form.
   a) $(3a^3b^3)(4ab^2)^2$
   b) $\left(\frac{3x^{3/2}y^3}{x^2y^6}\right)^{-2}$
   c) $\sqrt{200} - \sqrt{32}$
   d) $\frac{3x}{\sqrt[3]{3x^2}}$
   e) $(x - y)^2 - (x + y)^2$
   f) $(\sqrt{a} + \sqrt{b})(\sqrt{a} - \sqrt{b})$
   g) $\frac{x^2 + 3x + 2}{x^2 - x - 2}$
   h) $\frac{x^2 - 4}{x - 2} - \frac{x + 1}{x + 2}$
   i) $\frac{y^2 - x^2}{xy} + \frac{x - y}{yx}$

3. Factor completely each of the following:
   a) $8x^2 - 50$
   b) $2x^2 + 5x - 12$
   c) $x^3 - 3x^2 - 4x + 12$
   d) $x^3 - 4x^3 + 3$
   e) $3(y - 2)^2 + (y - 2)$
4. Evaluate each of the following:
   a) \(8^{\frac{4}{3}}\)    b) \(-243^{\frac{4}{5}}\)

5. Solve each of the following for all **EXACT** real value(s) of \(x\):
   a) \(6x^3 + x^2 = x\)    b) \(2 + 3|x - x| = 5\)    c) \(\frac{1}{x+1} + \frac{2}{x-1} = 3\)
   d) \(3 + \sqrt{x-1} = x\)

6. Rationalize the denominator.
   a) \(\frac{5x}{\sqrt{3}x^2}\)    b) \(\frac{\sqrt{3} - \sqrt{5}}{\sqrt{3} + \sqrt{5}}\)

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**Math 115 Exam I ("Midterm I") Review Answers**

**Algebra Skills**

1. a) [5,7]    b) (-3,7) \(\cup\) (10,\(\infty\))    c) Empty set

2. a) \(48a^3b^7\)    b) \(\frac{x}{9y^6}\)    c) \(6\sqrt{2}\)    d) \(\frac{2}{3}\sqrt{x}\)    e) \(-4xy\)    f) \(a\) \(b\)
   g) \(\frac{x+2}{x-2}\)    h) \(\frac{1}{x-2}\)    i) \(-(y+x)\) or \(-y-x\)

3. a) \(2(2x-5)(2x+5)\)    b) \((2x-3)(x+4)\)    c) \((x-3)(x+2)(x-2)\)
   d) \((x^{\frac{1}{3}} - 3)(x^{\frac{1}{3}} - 1)\)    e) \((y-2)(3y^2 - 6y + 1)\)

4. a) \(\frac{1}{16}\)    b) \(-\frac{1}{81}\)

5. a) \(0, \frac{1}{3}, -\frac{1}{2}\)    b) 2, 4    c) \(\frac{3 \pm \sqrt{57}}{6}\)    d) 5

6. a) \(\sqrt[3]{25x}\)    b) \(-4 + \sqrt{15}\)