**MTH 121**
**Exam 2, Form B**
**No Calculator Part**
**Spring 2013**

No calculators allowed on this page. You must completely finish this page and turn it in before you may use a calculator.

(On this page only, assume any variables represent positive numbers.)

**1.** (5 pts.) Put in simplest exponential form: (1) no radicals, and (2) positive exponents only. $\dfrac{(2u^{-3}v^{-1})^3}{(6u^{-2})^2}$

**2.** (4 pts.) Put in simplest exponential form: (1) no radicals, and (2) positive exponents only. $\sqrt[3]{a}\sqrt[5]{a}$

**3.** (5 pts.) Simplify by removing perfect powers from the radicand. Leave the radical sign in your answer. $\sqrt[4]{\dfrac{16a^9}{b^7}}$

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These formulas may or may not be useful:

$$a^3+b^3=(a+b)(a^2-ab+b^2) \quad a^3-b^3=(a-b)(a^2+ab+b^2) \quad x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$x$-axis: $y \to -y$ $y$-axis: $x \to -x$ origin: $x \to -x$ and $y \to -y$

Justify your answers with *neat and organized* work. 100 points possible.

**1.** (8 pts.) For the given points, (a) find the distance between the points, and (b) find the midpoint of the line segment joining the points.
$(2,-3)$, $(5,7)$

**2.** (6 pts.) Write the standard form of the equation of the circle with the given characteristics.

Endpoints of a diameter: $(1,2)$, $(5,8)$

**3.** (6 pts.) Use the Quadratic Formula to solve the equation. $8x^2-24x=-12$

**4.** (6 pts.) Solve the quadratic equation by factoring: $13x+5-6x^2=0$

**5.** (6 pts.) Solve the inequality and sketch the solution on the real number line.
$\frac{1}{5}x+8 \geq 2x-3$

**6.** (6 pts.) Solve the inequality and sketch the solution on the real number line.
$|6-2x|>13$

**7.** (10 pts.) Drane and Route Plumbing Co. charges \$82 per hour, plus \$55 for the service call. Let $x$ be the number of hours they work.

(a) Write the definition of $x$. Then write an expression for the number of dollars you must pay if they work for $x$ hours.

(b) How much would you pay for $3\frac{1}{2}$ hours?

(c) How long did they work if the bill is \$403.50?

**8.** (10 pts.) For this problem, when the answers are not integers, express the answers either as mixed numbers or as decimals, rounded to two decimal places.

Rose and Colin live in houses that are 2000 yards apart. Rose starts from home on her bicycle at 4.4 yards per second and rides toward Colin's. At the same time, Colin starts from his house at 3.1 yards per second and rides toward Rose's.

(a) How far is Rose from her house after $x$ seconds?

(b) How far is Colin from *Rose's* house after $x$ seconds?

(c) After 5 minutes, who is closer to Rose's house?

(d) When are they the same distance from Rose's house?

**9.** (6 pts.) Solve (and check your answer): $4 + \dfrac{3}{x+5} = \dfrac{2}{3}$

**10.** (6 pts.) Solve the quadratic equation by completing the square:
$4x^2 - 24x - 10 = 0$

**11.** (8 pts.) Combine into a single fraction and simplify.

$$\frac{x^2 - 8x}{x^3 + 4x^2} \div \frac{x^2 - 64}{x^3}$$

**12.** (8 pts.) Combine into a single fraction and simplify.

$$\frac{x}{x^2 - 2x - 3} - \frac{3}{x^2 - 7x + 12}$$