

Name \_\_\_\_\_

Homework #3, Math 104, Fall 2008

Instructions: Write your answers to the exercises on the paper next to the problems and attach your work on additional sheets. You must show all work to receive credit.

1. Simplify the following expression as much as possible and write your answer as a single radical.

$$\frac{\sqrt[3]{3} \cdot \sqrt{2x}}{\sqrt[4]{6} \cdot \sqrt[6]{x}}$$

2. Factor the following as indicated, then simplify or factor further if possible:

a.  $x^{1/2} + x^{-1/2}$ , factor out  $x^{-1/2}$

b.  $2x^{5/3} - 5x^{2/3} + x^{1/3}$ , factor out  $x^{1/3}$

c.  $x^{-3/2} - 1 - x^{1/2}$ , factor out  $x^{-3/2}$

d.  $6(x+1)^{8/3} + 5(x+1)^{5/3} + (x+1)^{2/3}$ , factor out  $(x+1)^{2/3}$

3. Simplify the following radical expressions as much as possible:

a.  $\sqrt{216}$

b.  $\sqrt[3]{\sqrt{256}}$

c.  $\sqrt[3]{128}$

d.  $\sqrt[4]{648}$

e.  $\frac{\sqrt[3]{243xy^{-7}}}{\sqrt[3]{576x^{-3}y^{-2}}}$

4. Perform the operations indicated on the following radical expressions and simplify

a.  $\sqrt{3} + \sqrt{32} + \sqrt{5} \quad \sqrt{12} + \sqrt{15} + 1$

b.  $\sqrt[3]{x} + 1 \quad \sqrt[3]{x} - 4\sqrt{x} + 7$

c.  $\sqrt{x-1} + 5^2$

d.  $\sqrt{x-6} - 7^3$

5. Rationalize the denominators or numerators as indicated:

a. Denominator:  $\frac{1}{\sqrt[4]{8}}$

b. Numerator:  $\frac{\sqrt[3]{2}}{\sqrt[3]{45}}$

c. Denominator:  $\frac{2\sqrt{3} + 4\sqrt{xy}}{\sqrt{27x^3y^6}}$

d. Denominator:  $\frac{2\sqrt{a}}{2\sqrt{x} - \sqrt{y}}$

e. Numerator:  $\frac{\sqrt{x+h} - \sqrt{x}}{h}$

6. Solve the following algebraically. Be sure to verify your answers. You may check your work graphically, but you must show work (on attached pages) to receive credit.

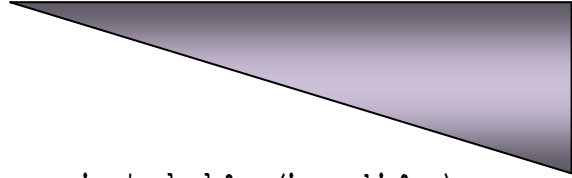
a.  $\sqrt{3x+4} - 1 = \sqrt{2x+1}$

b.  $\sqrt{x+1} - \sqrt{x-1} = 2$

7. Heron's formula allows you to find the area of a triangle knowing just the length of the sides. Use the formula below to find the area of a triangle whose side lengths are  $a=6$ ,  $b=10$  and  $c=14$ .

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

Heron's formula:  $s = \frac{1}{2} a + b + c$



8. Perform the indicated operations. Write your answers in standard form (i.e.  $a+bi$  form).

a.  $2 - 4i \quad 2 - i$

b.  $\frac{5}{2 - 3i}$

c.  $\frac{6 + 2i}{1 - i}$

d.  $i^{-17}$

e.  $\left(\frac{3}{2i}\right)^{-4}$

9. Solve the following equations by factoring:

a.  $1 - x \quad 3x + 2 = -4x$

b.  $x^3 - 18x = 3x^2$

c.  $2x^3 + 5x^2 = 8x + 20$

d.  $x + 2 \quad x - 2 = 5 \quad x + 4$

e.  $x + 1^3 - 5 \quad x + 1^2 + 6 \quad x + 1 = 0$