Math 54 – Beginning Algebra – Chapters §8.3-9.2,9.6 Test – Spring ’11 Name________________________

Instructions: Write all your responses to the following on separate paper. Show your work for credit. Take as much space as you need. Do not crowd into corners. Do not use an electronic calculator.

1. Write each of the following in simplified radical form
   a. $\sqrt{\frac{1}{3}}$
   b. $\sqrt[3]{\frac{1}{4}}$

2. Show that $x = 2 - \sqrt{5}$ is a solution to $x^2 - 4x - 1 = 0$

3. Rationalize the denominator:
   a. $\frac{4}{2 - \sqrt{3}}$
   b. $\frac{4}{\sqrt{2} - \sqrt{3}}$

4. Solve each equation. (If there is no solution, say so.)
   a. $\sqrt{2x} + 1 = 5$
   b. $\sqrt{2x + 1} = 5$

5. Find all solutions to each equation and simplify.
   a. $(3x + 1)^2 = 8$
   b. $\left(x - \frac{3}{7}\right)^2 = \frac{16}{49}$

6. Solve the equation by completing the square. Write the solutions in simplest radical form.
   a. $x^2 + 8x - 7 = 0$
   b. $x^2 = \frac{1}{2} - 4x$

7. Make a table of values and graph the solution set to $y = (x + 2)^2 - 3$ showing the vertex at 4 other points in the *x*-*y* coordinate plane.

Math 54 – Beginning Algebra – Chapters §8.3-9.2,9.6 Test Solutions

1. Write each of the following in simplified radical form

   a. $\sqrt{\frac{1}{3}}=\frac{\sqrt{1}}{\sqrt{3}}=\frac{1}{\sqrt{3}}=\frac{1}{\sqrt{3}}\frac{\sqrt{3}}{\sqrt{3}}=\boxed{\frac{\sqrt{3}}{3}}$

   b. $\sqrt[3]{\frac{1}{4}}=\frac{\sqrt[3]{1}}{\sqrt[3]{4}}=\frac{1}{\sqrt[3]{4}}=\frac{1}{\sqrt[3]{4}}\frac{\sqrt[3]{2}}{\sqrt[3]{2}}=\frac{\sqrt[3]{2}}{\sqrt[3]{8}}=\boxed{\frac{\sqrt[3]{2}}{2}}$

2. Show that $x=2-\sqrt{5}$ is a solution to $x^2-4x-1=0$

   SOLN: You can solve the equation directly and see that this is one of the solutions, but the idea here is to see that when you plug in $x=2-\sqrt{5}$ the equation is true:

   $\left(2-\sqrt{5}\right)^2-4\left(2-\sqrt{5}\right)-1=4-4\sqrt{5}+5-8+4\sqrt{5}-1=0$

3. Rationalize the denominator:

   a. $\frac{4}{2-\sqrt{3}}=\frac{4}{\left(2-\sqrt{3}\right)}\frac{\left(2+\sqrt{3}\right)}{\left(2+\sqrt{3}\right)}=\frac{4\left(2+\sqrt{3}\right)}{4-3}=\boxed{8+4\sqrt{3}}$

   b. $\frac{4}{\sqrt{2}-\sqrt{3}}=\frac{4}{\left(\sqrt{2}-\sqrt{3}\right)}\frac{\left(\sqrt{2}+\sqrt{3}\right)}{\left(\sqrt{2}+\sqrt{3}\right)}=\frac{4\left(\sqrt{2}+\sqrt{3}\right)}{\left(\sqrt{2}\right)^2-\left(\sqrt{3}\right)^2}=\boxed{-4\sqrt{2}-4\sqrt{3}}$

4. Solve each equation. (If there is no solution, say so.)

   a. $\sqrt{2x}+1=5\Leftrightarrow\sqrt{2x}=4\Rightarrow\left(\sqrt{2x}\right)^2=16\Leftrightarrow\boxed{x=8}$

   b. $\sqrt{2x+1}=5\Rightarrow\left(\sqrt{2x+1}\right)^2=25\Leftrightarrow 2x+1=25\Leftrightarrow 2x=24\Leftrightarrow\boxed{x=12}$

5. Find all solutions to each equation and simplify.

   a. $(3x+1)^2=8\Leftrightarrow 3x+1=\pm\sqrt{8}\Leftrightarrow 3x=-1\pm 2\sqrt{2}\Leftrightarrow\boxed{x=\frac{-1\pm 2\sqrt{2}}{3}}$

   b. $\left(x-\frac{3}{7}\right)^2=\frac{16}{49}\Leftrightarrow x-\frac{3}{7}=\pm\frac{4}{7}\Leftrightarrow x=\frac{3}{7}\pm\frac{4}{7}\Leftrightarrow\boxed{x=-\frac{1}{7}\text{ or }x=1}$

6. Solve the equation by completing the square. Write the solutions in simplest radical form.

   a. $x^2+8x-7=0\Leftrightarrow x^2+8x=7\Leftrightarrow x^2+8x+16=7+16\Leftrightarrow(x+4)^2=23\Leftrightarrow x+4=\pm\sqrt{23}\Leftrightarrow\boxed{x=-4\pm\sqrt{23}}$

   b. $x^2=\frac{1}{2}-4x\Leftrightarrow x^2+4x=\frac{1}{2}\Leftrightarrow x^2+4x+4=\frac{1}{2}+4\Leftrightarrow(x+2)^2=\frac{9}{2}\Leftrightarrow x+2=\frac{\pm 3}{\sqrt{2}}\frac{\sqrt{2}}{\sqrt{2}}\Leftrightarrow\boxed{x=-2\pm\frac{3\sqrt{2}}{2}}$

7. Make a table of values and graph the solution set to $y=(x+2)^2-3$ showing the vertex at 4 other points in the *x*-*y* coordinate plane.

SOLN:

x	-4	-3	-2	-1	0
y	1	-2	-3	-2	1