Math103 Intermediate Algebra – Fall 2008 – Arrowsmith – PreTest 4

Name SOLUTIONS !

Each of the 18 questions is worth 5 points plus 1 points for each of 10 homework problems for a total of 100

Simplify the root.

1) $\sqrt[3]{x^{27}}$

$(x^{27})^{1/3}$

$x^{\frac{27}{3}}$

$\boxed{x^9}$

Simplify by first converting to rational exponents. Assume that all variables represent positive real numbers.

2) $\sqrt[4]{100s^{18}}$

$(100s^{18})^{1/4}$

$([10s^9]^2)^{1/4}$

$(10s^9)^{2/4}$

$(10s^9)^{1/2}$

$\boxed{\sqrt{10s^9} \text{ or } s^4\sqrt{10s}}$

Use the rules of exponents to simplify the expression. Write the answer with positive exponents. Assume that all variables represent positive real numbers.

3) $\dfrac{x^{1/2}}{x^{5/4} \cdot x^{-3}}$

$\dfrac{x^{\frac{1}{2}}}{x^{\frac{5}{4}} \cdot x^{-3}}$

$x^{\frac{1}{2}-\frac{5}{4}-(-3)}$

$x^{\frac{2}{4}-\frac{5}{4}+\frac{12}{4}}$

$\boxed{x^{\frac{9}{4}}}$

Express the radical in simplified form.

4) $\sqrt[3]{864}$

$\sqrt[3]{216}\ \sqrt[3]{4}$

$\boxed{6\sqrt[3]{4}}$

Express the radical in simplified form. Assume that all variables represent positive real numbers.

5) $\sqrt[3]{\frac{y10}{125}}$

$\sqrt[3]{\frac{y^9}{125}}\ \sqrt[3]{y}$

$\boxed{\frac{y^3\sqrt[3]{y}}{5}}$

Simplify. Assume that all variables represent positive real numbers.

6) $4\sqrt{7} + 5\sqrt{63}$

$4\sqrt{7} + 5\sqrt{9}\sqrt{7}$

$4\sqrt{7} + 5 \cdot 3\sqrt{7}$

$4\sqrt{7} + 15\sqrt{7}$

$\boxed{19\sqrt{7}}$

7) $9\sqrt[3]{m^7p^5} - 7m^2p\sqrt[3]{mp^2}$

$9\sqrt[3]{m^6p^3}\sqrt[3]{mp^2} - 7m^2p\sqrt[3]{mp^2}$

$9m^2p\sqrt[3]{mp^2} - 7m^2p\sqrt[3]{mp^2}$

$\boxed{2m^2p\sqrt[3]{mp^2}}$

Multiply, then simplify the product. Assume that all variables represent positive real numbers.

8) $(3 - 5\sqrt{2})^2$

$(3-5\sqrt{2})(3-5\sqrt{2})$

$9 - 15\sqrt{2} - 15\sqrt{2} + 25(\sqrt{2})^2$

$9 - 30\sqrt{2} + 25 \cdot 2$

$9 - 30\sqrt{2} + 50$

$\boxed{59 - 30\sqrt{2}}$

Rationalize the denominator. Assume that all variables represent positive real numbers and that the denominator is not zero.

9) $\dfrac{\sqrt{7}}{7\sqrt{3} - \sqrt{7}}$

$\dfrac{\sqrt{7}}{(7\sqrt{3}-\sqrt{7})} \cdot \dfrac{(7\sqrt{3}+\sqrt{7})}{(7\sqrt{3}+\sqrt{7})}$

$\dfrac{\sqrt{7}(7\sqrt{3}) + \sqrt{7}\sqrt{7}}{(7\sqrt{3})^2 - (\sqrt{7})^2}$

$\dfrac{7\sqrt{21} + 7}{49 \cdot 3 - 7}$

$\dfrac{7(\sqrt{21}+1)}{7(21-1)}$

$\boxed{\dfrac{\sqrt{21}+1}{20}}$

Solve the equation.

10) $\sqrt{2k+1} = 13$

$(\sqrt{2k+1})^2 = 13^2$

$2k+1 = 169$

$2k = 168$

$\boxed{k = 84}$

Solve this equation.

11) $\sqrt{3x+10} = 5 - 2x$

$3x+10 = (5-2x)^2$

$3x+10 = 25-20x+4x^2$

$4x^2 - 23x + 15 = 0$

$x = \dfrac{-(-23) \pm \sqrt{(-23)^2 - 4(4)(15)}}{2(4)}$

$x = \dfrac{23 \pm \sqrt{529-240}}{8}$

$x = \dfrac{23 \pm \sqrt{289}}{8}$

$x = \dfrac{23 \pm 17}{8}$

$x = \dfrac{40}{8} \quad x = \dfrac{6}{8}$

$x = 5, \frac{3}{4}$

$\boxed{x = \frac{3}{4}}$

CHECKING $x=5$:

$\sqrt{3(5)+10} \stackrel{?}{=} 5-2(5)$

$\sqrt{15+10} \stackrel{?}{=} 5-10$

$\sqrt{25} \stackrel{?}{=} -5$

$5 \neq -5$

CHECKING $x = \frac{3}{4}$:

$\sqrt{3(\frac{3}{4})+10} \stackrel{?}{=} 5-2(\frac{3}{4})$

$\sqrt{\frac{9}{4}+\frac{40}{4}} \stackrel{?}{=} \frac{20}{4} - \frac{6}{4}$

$\sqrt{\frac{49}{4}} \stackrel{?}{=} \frac{14}{4}$

$\frac{7}{2} \equiv \frac{7}{2}$

Multiply or divide as indicated.

12) $\dfrac{\sqrt{-144}}{\sqrt{-4}}$

$\dfrac{i\sqrt{144}}{i\sqrt{4}}$

$\dfrac{12i}{2i}$

$\boxed{6}$

Add or subtract as indicated. Write your answer in the form a + bi.

13) $[(4 + 6i) - (10 + 7i)] - (5 - 6i)$

$4 + 6i - 10 - 7i - 5 + 6i$

$4 - 10 - 5 + 6i - 7i + 6i$

$\boxed{-11 + 5i}$

Use the quadratic formula to solve the equation. (All solutions are real numbers.)

14) $x^2 = 3 - 4x$

$x^2 + 4x - 3 = 0$

$A = 1$

$B = 4$

$C = -3$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \dfrac{-4 \pm \sqrt{4^2 - 4(1)(-3)}}{2(1)}$

$x = \dfrac{-4 \pm \sqrt{16 + 12}}{2}$

$x = \dfrac{-4}{2} \pm \dfrac{\sqrt{28}}{2}$

$x = -2 \pm \dfrac{\sqrt{4}\sqrt{7}}{2}$

$x = -2 \pm \dfrac{2\sqrt{7}}{2}$

$\boxed{x = -2 \pm \sqrt{7}}$

Use the quadratic formula to solve the equation.

15) $x^2 - \frac{2}{5}x = -\frac{7}{10}$

$10\left(x^2 - \frac{2}{5}x + \frac{7}{10}\right) = (0)\,10$

$10x^2 - 4x + 7 = 0$

$A = 10$

$B = -4$

$C = 7$

$x = \dfrac{-(-4) \pm \sqrt{(-4)^2 - 4(10)(7)}}{2(10)}$

$x = \dfrac{4 \pm \sqrt{16 - 280}}{20}$

$x = \dfrac{4 \pm \sqrt{-264}}{20}$

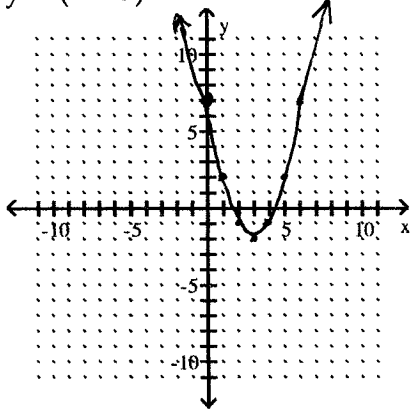
$x = \dfrac{4 \pm i\sqrt{4}\sqrt{66}}{20}$

$x = \dfrac{4 \pm 2i\sqrt{66}}{20}$

$\boxed{x = \dfrac{2 \pm i\sqrt{66}}{10}}$

Sketch the graph of the parabola.

16) $y = (x - 3)^2 - 2$



x	y
0	7
1	2
2	-1
3	-2
4	-1
5	2
6	7

$y = (0-3)^2 - 2 = 9 - 2 = 7$
$y = (1-3)^2 - 2 = 4 - 2 = 2$
$y = (2-3)^2 - 2 = 1 - 2 = -1$
$y = (3-3)^2 - 2 = -2$
$y = (4-3)^2 - 2 = 1 - 2 = -1$
$y = (5-3)^2 - 2 = 4 - 2 = 2$
$y = (6-3)^2 - 2 = 9 - 2 = 7$

Identify the vertex of the given parabola.

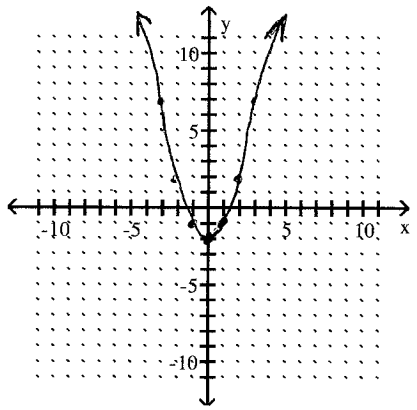
17) $f(x) = (x + 2)^2 + 9$

$f(x) = 1(x - (-2))^2 + 9$
$\quad\;\; a \quad\; h \quad\;\; k$

VERTEX IS AT $(h, k) = (-2, 9)$

Sketch the graph of the parabola.

18) $y = x^2 - 2$



x	y
-3	7
-2	2
-1	-1
0	-2
1	-1
2	2
3	7

$y = (-3)^2 - 2 = 9 - 2 = 7$
$y = (-2)^2 - 2 = 4 - 2 = 2$
$y = (-1)^2 - 2 = 1 - 2 = -1$
$y = (0)^2 - 2 = -2$