

MAC1105 College Algebra  
1.6 Practice Problems

Solve the following equations

1.  $2x^3 = 6x^2$   
 $-6x^2 \quad -6x^2$

$2x^3 - 6x^2 = 0$

$2x^2(x-3) = 0$

$\frac{2x^2}{2} = 0 \quad x-3 = 0$   
 $x^2 = 0 \quad +3 \quad +3$

$\sqrt{x^2} = \sqrt{0}$   
 $x = 0$

2.  $x^3 + 2x^2 - 9x - 18 = 0$

$x^2(x+2) - 9(x+2) = 0$

$(x+2)(x^2-9) = 0$

$(x+2)(x+3)(x-3) = 0$

$x+2=0 \quad x+3=0 \quad x-3=0$   
 $x=-2 \quad x=-3 \quad x=3$

3.  $\sqrt{4x+16} - 1 = x$   
 $+1 \quad +1$

$\sqrt{4x+16} = x+1$

$(\sqrt{4x+16})^2 = (x+1)^2$

$4x+16 = x^2+2x+1$   
 $-4x-16 \quad -4x-16$   
 $0 = x^2-2x-15$

4.  $\sqrt{x-4} + \sqrt{x+1} = 5$

$\sqrt{x-4} = 5 - \sqrt{x+1}$

$(\sqrt{x-4})^2 = (5 - \sqrt{x+1})^2$

$x-4 = (5 - \sqrt{x+1})(5 - \sqrt{x+1})$

$x-4 = 25 - 5\sqrt{x+1} - 5\sqrt{x+1} + x+1$

$x-4 = 26 - 10\sqrt{x+1} + x$   
 $-x-26 \quad -26 \quad -x$

$-30 = -10\sqrt{x+1}$

5.  $2x^{\frac{3}{2}} - 16 = 0$

$2\sqrt{x^3} - 16 = 0$   
 $+16 \quad +16$

$\frac{2\sqrt{x^3}}{2} = \frac{16}{2}$

$\sqrt{x^3} = 8$

$(\sqrt{x^3})^2 = 8^2$

$x^3 = 64$

$\sqrt[3]{x^3} = \sqrt[3]{64}$

$x = 4$

Check:  $x=0$

$2(0)^3 = 6(0)^2$

$2(0) = 6(0)$

$0 = 0$

True

Check  $x=2$

$2(3)^3 = 6(3)^2$

$2(27) = 6(9)$

$54 = 54$

True

Solution  
0,3

Check  $x=-2$

$(-2)^3 + 2(-2)^2 - 9(-2) - 18 = 0$

$-8 + 8 + 18 - 18 = 0$   
 $0 = 0$  TRUE

Check  $x=-3$

$(-3)^3 + 2(-3)^2 - 9(-3) - 18 = 0$

$-27 + 18 + 27 - 18 = 0$   
 $0 = 0$  TRUE

Check  $x=3$

$3^3 + 2(3)^2 - 9(3) - 18 = 0$

$27 + 18 - 27 - 18 = 0$   
 $0 = 0$  TRUE

Solutions

-2, -3, 3

$0 = x^2 - 2x - 15$

$0 = (x-5)(x+3)$

$x-5=0 \quad x+3=0$   
 $+5 \quad +5 \quad -3 \quad -3$   
 $x=5 \quad x=-3$

Solution  
5

Check  $x=5$

$\sqrt{4(5)+16} - 1 = 5$

$\sqrt{20+16} - 1 = 5$

$\sqrt{36} - 1 = 5$

$6 - 1 = 5$

$5 = 5$

TRUE

Check  $x=-3$

$\sqrt{4(-3)+16} - 1 = -3$

$\sqrt{-12+16} - 1 = -3$

$\sqrt{4} - 1 = -3$

$2 - 1 = -3$

$1 = -3$

False

$\frac{-30}{-10} = \frac{-10\sqrt{x+1}}{-10}$

$3 = \sqrt{x+1}$

$3^2 = (\sqrt{x+1})^2$

$9 = x+1$

$-1 \quad -1$   
 $8 = x$

Check  $x=8$

$\sqrt{8-4} + \sqrt{8+1} = 5$

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

$2 + 3 = 5$

$5 = 5$

TRUE

Solution  
8

Check  $x=4$

$2\sqrt{4^3} - 16 = 0$

$2\sqrt{64} - 16 = 0$

$2 \cdot 8 - 16 = 0$

$16 - 16 = 0$

$0 = 0$

True

Solution

4

$$6. x^{\frac{2}{3}} - 25 = 0$$

$$\sqrt[3]{x^2} - 25 = 0$$

$$+25 \quad +25$$

$$\sqrt[3]{x^2} = 25$$

$$(\sqrt[3]{x^2})^3 = 25^3$$

$$x^2 = 15625$$

$$\sqrt{x^2} = \sqrt{15625}$$

$$x = \pm 125$$

Solutions  
 $\pm 125$

Check  $x = \pm 125$

$$\sqrt[3]{(\pm 125)^2} - 25 = 0$$

$$\sqrt[3]{15625} - 25 = 0$$

$$25 - 25 = 0$$

$$0 = 0$$

True

$$7. x^4 - 13x^2 + 36 = 0$$

$$(x^2 - 9)(x^2 - 4) = 0$$

$$(x+3)(x-3)(x+2)(x-2) = 0$$

$$x+3=0 \quad x-3=0 \quad x+2=0 \quad x-2=0$$

$$x = -3 \quad x = 3 \quad x = -2 \quad x = 2$$

Solutions  
 $\pm 3, \pm 2$

$$8. 2x^{\frac{2}{3}} + 7x^{\frac{1}{3}} + 5 = 0$$

$$\text{Let } u = x^{\frac{1}{3}}$$

$$u^2 = x^{\frac{2}{3}}$$

$$2u^2 + 7u + 5 = 0$$

$$(2u + 5)(u + 1) = 0$$

$$2u + 5 = 0 \quad u + 1 = 0$$

$$\frac{2u}{2} = \frac{-5}{2}$$

$$u = -1$$

$$u = \frac{-5}{2}$$

$$x^{\frac{1}{3}} = -1$$

$$x^{\frac{1}{3}} = \frac{-5}{2}$$

$$\sqrt[3]{x} = -1$$

$$(\sqrt[3]{x})^3 = (-1)^3$$

$$(\sqrt[3]{x}) = \frac{-5}{2}$$

$$x = -1$$

$$(\sqrt[3]{x})^3 = \left(\frac{-5}{2}\right)^3$$

$$x = \frac{-125}{8}$$

Solutions  
 $\frac{-125}{8}, -1$

Check  $x = -1$

$$2\sqrt[3]{(-1)^2} + 7\sqrt[3]{-1} + 5 = 0$$

$$2\sqrt[3]{1} + 7(-1) + 5 = 0$$

$$2 - 7 + 5 = 0$$

$$0 = 0$$

True

Check  $x = \frac{-125}{8}$

$$2\sqrt[3]{\left(\frac{-125}{8}\right)^2} + 7\sqrt[3]{\frac{-125}{8}} + 5 = 0$$

$$2\sqrt[3]{\frac{15625}{64}} + 7\left(\frac{-5}{2}\right) + 5 = 0$$

$$2\left(\frac{25}{4}\right) + \frac{-35}{2} + 5 = 0$$

$$\frac{25}{2} + \frac{-35}{2} + 5 = 0$$

$$\frac{-10}{2} + 5 = 0$$

$$-5 + 5 = 0$$

$$0 = 0$$

True