Mth 098 – Intermediate Algebra – **Practice Exam 6 Solutions**

1. $\sqrt[3]{64} = 4$

2. $\sqrt{(-23)^2} = |-23| = 23$

3. $\sqrt[3]{\dfrac{8}{27}} = \dfrac{\sqrt[3]{8}}{\sqrt[3]{27}} = \dfrac{2}{3}$

4. $125^{-\frac{1}{3}} = \dfrac{1}{125^{\frac{1}{3}}} = \dfrac{1}{\sqrt[3]{125}} = \dfrac{1}{5}$

5. $8^{\frac{4}{3}} = \left(\sqrt[3]{8}\right)^4 = 2^4 = 16$

6. $(-81)^{\frac{3}{4}} = \left(\sqrt[4]{-81}\right)^3$ This is not a real number.

7. $\sqrt{a^2 + 8a + 16} = \sqrt{(a+4)^2} = |a+4|$

8. $x^{\frac{2}{3}} \cdot x^{\frac{5}{6}} = x^{\frac{2}{3}+\frac{5}{6}} = x^{\frac{4}{6}+\frac{5}{6}} = x^{\frac{9}{6}} = x^{\frac{3}{2}}$

9. $\sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2}$

10. $\sqrt[3]{9} \cdot \sqrt[3]{6} = \sqrt[3]{54} = \sqrt[3]{27 \cdot 2} = 3\sqrt[3]{2}$

11. $\sqrt[3]{16a^7b^9} = \sqrt[3]{8 \cdot 2 \cdot a^6 \cdot a \cdot b^9} = 2a^2b^3\sqrt[3]{2a}$

12. $\dfrac{\sqrt[3]{3}}{\sqrt[3]{81}} = \sqrt[3]{\dfrac{3}{81}} = \sqrt[3]{\dfrac{1}{27}} = \dfrac{\sqrt[3]{1}}{\sqrt[3]{27}} = \dfrac{1}{3}$

13. $\sqrt{18} + 3\sqrt{8} = \sqrt{9 \cdot 2} + 3\sqrt{4 \cdot 2} = 3\sqrt{2} + 3 \cdot 2\sqrt{2} = 3\sqrt{2} + 6\sqrt{2} = 9\sqrt{2}$

14. $\sqrt{3}\left(\sqrt{12} + \sqrt{6}\right) = \sqrt{36} + \sqrt{18} = 6 + \sqrt{9 \cdot 2} = 6 + 3\sqrt{2}$

15. $\dfrac{3}{\sqrt{3}} = \dfrac{3}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{3\sqrt{3}}{3} = \sqrt{3}$

16. $\dfrac{4}{\sqrt[4]{2}} = \dfrac{4}{\sqrt[4]{2}} \cdot \dfrac{\sqrt[4]{8}}{\sqrt[4]{8}} = \dfrac{4\sqrt[4]{8}}{\sqrt[4]{16}} = \dfrac{4\sqrt[4]{8}}{2} = 2\sqrt[4]{8}$

17. $\dfrac{2}{\sqrt{3}+\sqrt{2}} = \dfrac{2}{\left(\sqrt{3}+\sqrt{2}\right)} \cdot \dfrac{\left(\sqrt{3}-\sqrt{2}\right)}{\left(\sqrt{3}-\sqrt{2}\right)} = \dfrac{2\left(\sqrt{3}-\sqrt{2}\right)}{\sqrt{3}^2-\sqrt{2}^2} = \dfrac{2\left(\sqrt{3}-\sqrt{2}\right)}{3-2} = \dfrac{2\left(\sqrt{3}-\sqrt{2}\right)}{1} = 2\sqrt{3}-2\sqrt{2}$

18. $\sqrt{x-3} = -2$

$\Rightarrow \quad \sqrt{x-3}^2 = (-2)^2 \quad \Rightarrow \quad x-3=4 \quad \Rightarrow \quad x=7$

$check: \sqrt{7-3} \overset{?}{=} -2 \quad \Rightarrow \quad \sqrt{4} \overset{?}{=} -2$ no!

There are no solutions to this equation.

19. $\sqrt[4]{3x+1} = 2$

$\Rightarrow \quad \sqrt[4]{3x+1}^4 = 2^4 \quad \Rightarrow \quad 3x+1=16 \quad \Rightarrow \quad 3x=15 \quad \Rightarrow \quad x=5$

$check: \sqrt[4]{3\cdot 5+1} \overset{?}{=} 2 \quad \Rightarrow \quad \sqrt[4]{16} \overset{?}{=} 2$ yes

The solution to this equation is $x = 5$.

20.

$\sqrt{2x+3}-5=0 \quad \Rightarrow \quad \sqrt{2x+3}=5 \quad \Rightarrow \quad \sqrt{2x+3}^2 = 5^2$

$\Rightarrow \quad 2x+3=25 \quad \Rightarrow \quad 2x=22 \quad \Rightarrow \quad x=11$

$check: \sqrt{2\cdot 11+3}-5 \overset{?}{=} 0 \quad \Rightarrow \quad \sqrt{25}-5 \overset{?}{=} 0$ yes

The solution to this equation is $x = 11$.

21. $\sqrt{-9}+\sqrt{-16} = 3i+4i = 7i$

22. $\sqrt{-3}\cdot\sqrt{-12} = i\sqrt{3}\cdot 2i\sqrt{3} = 2i^2\cdot 3 = 6i^2 = 6(-1) = -6$

23. $(3+i)(1-2i) = 3-6i+i-2i^2 = 3-5i-2(-1) = 3-5i+2 = 5-5i$

24. $\dfrac{4}{3i} = \dfrac{4}{3i}\cdot\dfrac{-3i}{-3i} = \dfrac{-12i}{-9i^2} = \dfrac{-12i}{-9(-1)} = \dfrac{-12i}{9} = -\dfrac{12}{9}i = -\dfrac{4}{3}i$

25. $\dfrac{3}{5+i} = \dfrac{3}{(2+i)}\cdot\dfrac{(2-i)}{(2-i)} = \dfrac{3(2-i)}{4-i^2} = \dfrac{3(2-i)}{4-(-1)} = \dfrac{3(2-i)}{4+1} = \dfrac{3(2-i)}{5} = \dfrac{6-3i}{5} = \dfrac{6}{5}-\dfrac{3}{5}i$