INTERMEDIATE ALGEBRA/MATH 64

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EXAM 2/CHAPTER 10.1-10.7

- *90 POINTS POSSIBLE*
- *YOUR WORK MUST SUPPORT YOUR ANSWER FOR FULL CREDIT TO BE AWARDED*
- *NO GRAPHING CALCULATOR IS PERMITTED*
- *PROVIDE EXACT ANSWERS (NO DECIMALS PLEASE)*

ONCE YOU BEGIN THE EXAM, YOU MAY NOT LEAVE THE PROCTORING CENTER UNTIL YOU ARE FINISHED. THIS MEANS NO BATHROOM BREAKS…

NAME Key

CREDIT WILL BE AWARDED BASED ON WORK SHOWN. THERE WILL BE NO CREDIT FOR GUESSING. PLEASE PRESENT YOUR WORK IN AN ORGANIZED, EASY TO READ FASHION. YOU MAY USE A SCIENTIFIC CALCULATOR. NO GRAPHING CALCULATORS ARE PERMITTED. NO DECIMALS ARE PERMITTED.

1. (6 POINTS) No credit will be awarded for guessing. Solve the radical equation.

$(4x+5)^{1/3} - 4 = -6$

$+4 \quad +4$

$[(4x+5)^{1/3}]^3 = [-2]^3$

$4x+5 = -8$

$-5 \quad -5$

$\left(\frac{1}{4}\right)4x = (-13)\frac{1}{4}$

$x = -\frac{13}{4}$

$\left\{-\frac{13}{4}\right\}$

2. (5 POINTS) Simplify. Assume variables can be any real number. Include absolute value bars where necessary.

a. (3 POINTS)

$\sqrt[6]{(x-2)^6} = |x-2|$

b. (2 POINTS)

$\sqrt[3]{-125} = \sqrt[3]{(-5)^3}$

$= -5$

3. (8 POINTS) Multiply and simplify. Assume that all variables in a radicand represent positive real numbers.

$\sqrt{2x^8y^5}\sqrt{8x^2y^3} = \sqrt{(2x^8y^5)(8x^2y^3)}$

$= \sqrt{16x^{10}y^8}$

$= \sqrt{(4)^2(x^5)^2(y^4)^2}$

$= 4x^5y^4$

4. (10 POINTS) No credit will be awarded for guessing. Solve the radical equation.

$\sqrt{x+2}+\sqrt{3x+7}=1$

$-\sqrt{3x+7}\quad -\sqrt{3x+7}$

$\left(\sqrt{x+2}\right)^2=\left(1-\sqrt{3x+7}\right)^2$

$x+2=\left(1-\sqrt{3x+7}\right)\left(1-\sqrt{3x+7}\right)$

$x+2=1-\sqrt{3x+7}-\sqrt{3x+7}+\left(\sqrt{3x+7}\right)^2$

$x+2=1-2\sqrt{3x+7}+3x+7$

$x+2=8-2\sqrt{3x+7}+3x$

$-3x-8\quad -8\quad -3x$

$-\frac{1}{2}(-2x-6)=(-2\sqrt{3x+7})(-\frac{1}{2})$

$(x+3)^2=\left(\sqrt{3x+7}\right)^2$

$(x+3)(x+3)=3x+7$

$x^2+3x+3x+9=3x+7$

$x^2+6x+9=3x+7$

$-3x-7\quad -3x-7$

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

$(x+2)(x+1)=0$

$x+2=0$ or $x+1=0$

$x=-2\qquad x=-1$

extraneous

$\{-2\}$

check:

$x=-2$: $\sqrt{(-2)+2}+\sqrt{3(-2)+7}\stackrel{?}{=}1$

$\sqrt{0}+\sqrt{1}\stackrel{?}{=}1$

$\sqrt{1}\stackrel{?}{=}1$

$1=1$ ✓

$x=-1$: $\sqrt{(-1)+2}+\sqrt{3(-1)+7}\stackrel{?}{=}1$

$\sqrt{1}+\sqrt{4}\stackrel{?}{=}1$

$1+2\stackrel{?}{=}1$

$3\neq 1$

5. (10 POINTS) No credit will be awarded for guessing. Solve the radical equation.

$$\left(x+1\right)^2=\left(\sqrt{2x+5}\right)^2$$

$(x+1)(x+1) = 2x+5$

$x^2+x+x+1 = 2x+5$

$x^2+2x+1 = 2x+5$

$-2x-5 \quad -2x-5$

$x^2-4 = 0$

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

$x+2=0$ or $x-2=0$

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

-2 extraneous

check:

$x=-2$:

$(-2)+1 \stackrel{?}{=} \sqrt{2(-2)+5}$

$-1 \stackrel{?}{=} \sqrt{1}$

$-1 \neq 1$

$x=2$:

$(2)+1 \stackrel{?}{=} \sqrt{2(2)+5}$

$3 \stackrel{?}{=} \sqrt{9}$

$3=3\checkmark$

$\{2\}$

6. (8 POINTS) Simplify. Assume that all variables represent positive real numbers.

$$\sqrt{\frac{128x^6y}{2xy^{-3}}} = \sqrt{64x^{6-1}y^{1-(-3)}}$$

$$= \sqrt{64x^5y^4}$$

$$= \sqrt{(8)^2(x^4)(x)(y^2)^2}$$

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

$$= \boxed{8x^2y^2\sqrt{x}}$$

7. (6 POINTS) Subtract. Write the result in the form $a+bi$.

$$(7+5i)-(6-i) = 7+5i-6+i$$

$$= 7-6+5i+i$$

$$= \boxed{1+6i}$$

8. (8 POINTS) Divide and simplify to the form $a+bi$.

$$\frac{5-i}{2+i}\cdot\frac{2-i}{2-i}=\frac{(5-i)(2-i)}{(2)^2-(i)^2}$$

$$=\frac{10-5i-2i+(i)^2}{4-(-1)}$$

$$=\frac{10-7i+(-1)}{5}$$

$$=\frac{9-7i}{5}$$

$$=\boxed{\frac{9}{5}-\frac{7}{5}i}$$

9. (8 POINTS) Rationalize the denominator. Simplify, if possible.

$$\frac{2}{\sqrt{x}+3}\cdot\frac{\sqrt{x}-3}{\sqrt{x}-3}=\frac{2(\sqrt{x}-3)}{(\sqrt{x})^2-(3)^2}$$

$$=\boxed{\frac{2\sqrt{x}-6}{x-9}}$$

10. (4 POINTS) Rationalize the numerator. Simplify, if possible.

$$\frac{\sqrt[3]{25x}}{4}=\frac{\sqrt[3]{(5)^2(x)^1}}{4}\cdot\frac{\sqrt[3]{(5)^1(x)^2}}{\sqrt[3]{(5)^1(x)^2}}$$

$$=\frac{\sqrt[3]{(5)^3(x)^3}}{4\sqrt[3]{5x^2}}$$

$$=\boxed{\frac{5x}{4\sqrt[3]{5x^2}}}$$

11. (4 POINTS) Simplify.

i^{25}

$= (i^2)^{12}(i)$

$= (-1)^{12}(i)$

$= (1)(i)$

$= \boxed{i}$

12. (8 POINTS) Multiply. Write imaginary results in the form $a+bi$.

$\left(2+\sqrt{-16}\right)\left(4-\sqrt{-9}\right)$

$= (2+4i)(4-3i)$

$= 8-6i+16i-12i^2$

$= 8+10i-12(-1)$

$= \boxed{20+10i}$

13. (5 POINTS) Use rational exponents to simplify the expression. If rational exponents appear after simplifying, write the answer in radical notation. Assume that all variables represent positive numbers.

$\dfrac{\sqrt[10]{x^9}}{\sqrt[5]{x^3}}$

$= \dfrac{x^{9/10}}{x^{3/5}}$

$9/10 - \frac{3}{5}\cdot\frac{2}{2}$

$= x$

$= x^{\frac{9}{10}-\frac{6}{10}}$

$= x^{3/10}$

$= \boxed{\sqrt[10]{x^3}}$