Math 1050 Test 4 Name: Key

Show all necessary steps clearly, neatly, systematically to receive full credit.

1. (2 pts) Multiply: $(7-2i)(3+i)$.

$= 21 + 7i - 6i - 2i^2$

$= 21 + i + 2$

$= 23 + i$ //

2. (2 pts) Find domain of $g(x) = \sqrt[3]{2x-7}$.

Domain : $(-\infty, \infty)$ //

3. (2 pts) Multiply: $\left(2\sqrt{k}+5\sqrt{m}\right)\left(\sqrt{k}-4\sqrt{m}\right)$.

$= 2k - 8\sqrt{km} + 5\sqrt{km} - 20m$

$= 2k - 3\sqrt{km} - 20m$ //

4. (5 pts) Divide: $\dfrac{2-3i}{2+3i}$.

$= \dfrac{2-3i}{2+3i} \cdot \dfrac{2-3i}{2-3i}$

$= \dfrac{(2)^2 - 2(2)(3i) + (3i)^2}{(2)^2 - (3i)^2}$

$= \dfrac{4 - 12i + 9i^2}{4 - 9i^2}$

$= \dfrac{4 - 12i - 9}{4 + 9}$

$= \dfrac{-5 - 12i}{13}$

$= -\dfrac{5}{13} - \dfrac{12}{13}i$ //

5. (5 pts) Find domain of $f(x) = \sqrt{4-3x} + 5$.

radicant ≥ 0

$4 - 3x \geq 0$

$-3x \geq -4$

$x \leq \dfrac{-4}{-3}$

$x \leq \dfrac{4}{3}$

Domain : $\left(-\infty, \dfrac{4}{3}\right]$ //

6. (5 pts) Solve: $2(2x-5)^2+5=15$.

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

$(2x-5)^2 = 5$

$\sqrt{(2x-5)^2} = \pm\sqrt{5}$

$2x-5 = \pm\sqrt{5}$

$2x = 5 \pm \sqrt{5}$

$x = \dfrac{5 \pm \sqrt{5}}{2}$

$\left\{ \dfrac{5-\sqrt{5}}{2}, \dfrac{5+\sqrt{5}}{2} \right\}$ //

7. (5 pts) Solve: $\sqrt{5-x}-1=x$.

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

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

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

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

$0 = (x+4)(x-1)$

$x+4=0$ | $x-1=0$

$\cancel{x=-4}$ | $x=1$

$\{1\}$ //

8. (5 pts) Add:

$-3\sqrt[3]{24x^4y^8}+xy\sqrt[3]{-81xy^5}-4y\sqrt[3]{3x^4y^5}$

$8\cdot 3$ $\quad -27\cdot 3$

$= -3\cdot 2xy^2\sqrt[3]{3xy^2} + xy\cdot -3y\sqrt[3]{3xy^2} - 4y\cdot xy\sqrt[3]{3xy^2}$

$= -6xy^2\sqrt[3]{3xy^2} - 3xy^2\sqrt[3]{3xy^2} - 4xy^2\sqrt[3]{3xy^2}$

$= -13xy^2\sqrt[3]{3xy^2}$ //

9. (5 pts) Rationalize the denominator:

$\dfrac{3\sqrt{x}}{\sqrt{x}-2\sqrt{y}}$.

$= \dfrac{3\sqrt{x}}{\sqrt{x}-2\sqrt{y}} \cdot \dfrac{\sqrt{x}+2\sqrt{y}}{\sqrt{x}+2\sqrt{y}}$

$= \dfrac{3\sqrt{x}(\sqrt{x}+2\sqrt{y})}{(\sqrt{x})^2-(2\sqrt{y})^2}$

$= \dfrac{3x+6\sqrt{xy}}{x-4y}$ //

10. (5 pts) Solve by quadratic formula: $26r - 2 = 3r^2$.

$$0 = 3r^2 - 26r + 2$$

$$r = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-26) \pm \sqrt{(-26)^2 - 4(3)(2)}}{2(3)}$$

$$= \frac{26 \pm \sqrt{676 - 24}}{6}$$

$$= \frac{26 \pm \sqrt{652}}{6}$$

$$= \frac{26 \pm 2\sqrt{163}}{6}$$

$$= \frac{13 \pm \sqrt{163}}{3}$$

$r \approx 8.589$

$r \approx 0.078$

11. (7 pts) Let $f(x) = x^2 + 10x + 23$.

a. Find the vertex.

$$x = -\frac{b}{2a}$$

$$= -\frac{10}{2(1)}$$

$$= -5$$

$$y = f(-5)$$

$$= (-5)^2 + 10(-5) + 23$$

$$= -2$$

$(-5, -2)$

b. Write in $f(x) = a(x-h)^2 + k$.

$f(x) = (x+5)^2 - 2$

c. Find the axis of symmetry.

$x = -5$

d. Find maximum or minimum function value.

min function value $= -2$

e. Sketch.

12. (7 pts) Solve by completing the square method: $2x^2 - 16x + 2 = 0$.

$x^2 - 8x + 1 = 0$

$x^2 - 8x = -1$

$x^2 - 8x + 16 = -1 + 16$

$(x - 4)^2 = 15$

$x - 4 = \pm\sqrt{15}$

$x = 4 \pm \sqrt{15}$

$\{4 - \sqrt{15},\ 4 + \sqrt{15}\}$

13. (7 pts) Solve: $3x^{\frac{2}{3}} - x^{\frac{1}{3}} - 24 = 0$.

let $u = x^{\frac{1}{3}} = \sqrt[3]{x}$

$3u^2 - u - 24 = 0$

$(3u + 8)(u - 3) = 0$

$3u + 8 = 0$	$u - 3 = 0$
$3\sqrt[3]{x} + 8 = 0$	$\sqrt[3]{x} - 3 = 0$
$\sqrt[3]{x} = -\frac{8}{3}$	$\sqrt[3]{x} = 3$
$(\sqrt[3]{x})^3 = \left(-\frac{8}{3}\right)^3$	$(\sqrt[3]{x})^3 = (3)^3$
$x = -\frac{512}{27}$	$x = 27$

$\{-\frac{512}{27},\ 27\}$