

MATH 103 EXAM #4 KEY (SPRING 2011)

1a. $\sqrt[6]{(-9)^6} = |-9| = 9$

1b. $\sqrt{(-r)^2} = |-r| = |r|$

2a. $64^{3/2} = (64^{1/2})^3 = 8^3 = 512$

2b. $32^{-3/5} = (32^{1/5})^{-3} = 2^{-3} = 1/2^3 = 1/8$

3a. $r^{-8/9} \cdot r^{17/9} = r^{-8/9+17/9} = r$

3b. $\frac{m^{3/4}n^{-1/4}}{(m^2n)^{1/2}} = \frac{m^{3/4}n^{-1/4}}{m^1n^{1/2}} = \frac{1}{m^1m^{-3/4}n^{1/2}n^{1/4}} = \frac{1}{m^{1/4}n^{3/4}}$

4a. $\sqrt{72} = \sqrt{36 \cdot 2} = 6\sqrt{2}$

4b. $\sqrt{144x^3y^7} = 12xy^3\sqrt{xy}$

4c. $\sqrt[3]{-16z^5t^7} = \sqrt[3]{-8 \cdot 2 \cdot z^3 \cdot z^2 \cdot t^6 \cdot t} = -2zt^2\sqrt[3]{2z^2t}$

4d. $\sqrt{\frac{u^3}{121}} = \frac{\sqrt{u^3}}{\sqrt{121}} = \frac{u\sqrt{u}}{11}$

4e. $5\sqrt{8} + 8\sqrt{72} - 3\sqrt{50} = 5 \cdot 2\sqrt{2} + 8 \cdot 6\sqrt{2} - 3 \cdot 5\sqrt{2} = 10\sqrt{2} + 48\sqrt{2} - 15\sqrt{2} = 43\sqrt{2}$

5. $(2\sqrt{3} + \sqrt{5})(3\sqrt{3} - 2\sqrt{5}) = 6 \cdot 3 - 4\sqrt{15} + 3\sqrt{15} - 2 \cdot 5 = 8 - \sqrt{15}$

6a. $\frac{8}{\sqrt{24}} = \frac{8}{\sqrt{24}} \cdot \frac{\sqrt{24}}{\sqrt{24}} = \frac{8\sqrt{24}}{24} = \frac{16\sqrt{6}}{24} = \frac{2\sqrt{6}}{3}$

6b. $\frac{4}{2+\sqrt{5}} = \frac{4}{2+\sqrt{5}} \cdot \frac{2-\sqrt{5}}{2-\sqrt{5}} = \frac{8-4\sqrt{5}}{-1} = 4\sqrt{5} - 8$

7a. $9 - \sqrt{4y-1} = 0 \Rightarrow \sqrt{4y-1} = 9 \Rightarrow 4y-1 = 81 \Rightarrow 4y = 82 \Rightarrow y = 41/2$

7b. $\sqrt{7z+1} = z+1 \Rightarrow 7z+1 = (z+1)^2 \Rightarrow 7z+1 = z^2+2z+1 \Rightarrow z^2-5z = 0 \Rightarrow z(z-5) = 0 \Rightarrow z = 0, 5$

8a. $(9+i) - (5+6i) = 4-5i$

8b. $3i(4+9i) = 12i + 27i^2 = -27 + 12i$

$$\mathbf{8c.} \quad \frac{2-i}{3+i} = \frac{2-i}{3+i} \cdot \frac{3-i}{3-i} = \frac{6-2i-3i+i^2}{9-i^2} = \frac{6-5i-1}{9-(-1)} = \frac{5-5i}{10} = \frac{1}{2} - \frac{1}{2}i$$

$$\mathbf{9a.} \quad (x-3)(x+5) = 2 \Rightarrow x^2 + 2x - 15 = 2 \Rightarrow x^2 + 2x - 17 = 0 \Rightarrow x = \frac{-2 \pm \sqrt{2^2 - 4(1)(-17)}}{2(1)} = \frac{-2 \pm \sqrt{72}}{2} = \frac{-2 \pm 6\sqrt{2}}{2} = -1 \pm 3\sqrt{2}$$

$$\mathbf{9b.} \quad x^2 + 4x + 11 = 0 \Rightarrow x = \frac{-4 \pm \sqrt{4^2 - 4(1)(11)}}{2(1)} = \frac{-4 \pm \sqrt{-28}}{2} = \frac{-4 \pm 2i\sqrt{7}}{2} = -2 \pm i\sqrt{7}$$