Math 114
Midterm 2
Mon May 19, 2008

NAME: _____

[1] Write 0.0000812 in scientific notation. **[4 POINTS]**

8.12×10^{-5}

[2] Write 4.3×10^{-7} in standard notation. **[4 POINTS]**

0.00000043

[3] Simplify. **Your answer should use only positive exponents.** **[4 POINTS]**

$2r^3s^{-4}$

$\frac{2r^3}{s^4}$

[4] Write using fractional and/or negative exponents. **[8 POINTS]**

[a] $\frac{1}{\sqrt{e^5}}$

$e^{-\frac{5}{2}}$

[b] $\left(\sqrt[3]{w}\right)^2$

$w^{\frac{2}{3}}$

[5] Simplify. **You may write your answers using either radicals or fractional exponents.** **[26 POINTS]**

[a] $\left(121y^{-6}\right)^{\frac{1}{2}}$

$121^{\frac{1}{2}}\, y^{-6\cdot\frac{1}{2}}$

$11y^{-3}$ or $\frac{11}{y^3}$

[b] $\left(\frac{b^2 g^{\frac{10}{7}}}{k^{\frac{1}{3}}}\right)^{\frac{6}{5}}$

$\frac{b^{2\cdot\frac{6}{5}}\, g^{\frac{10}{7}\cdot\frac{6}{5}}}{k^{\frac{1}{3}\cdot\frac{6}{5}}}$

$\frac{b^{\frac{12}{5}}\, g^{\frac{12}{7}}}{k^{\frac{2}{5}}}$ or $b^{\frac{12}{5}} g^{\frac{12}{7}} k^{-\frac{2}{5}}$

[c] $t^{\frac{1}{5}} t^{\frac{2}{3}}$

$t^{\frac{1}{5}+\frac{2}{3}}$

$t^{\frac{13}{15}}$ or $\sqrt[15]{t^{13}}$

[6] Rationalize the denominator, and simplify. **[8 POINTS]**

$$\frac{6}{\sqrt{13}+4}$$

$$\frac{6(\sqrt{13}-4)}{13-16}$$

$$\frac{-2\cancel{6}(\sqrt{13}-4)}{\cancel{-3}}$$

$$-2(\sqrt{13}-4)$$

$$-2\sqrt{13}+8 \text{ or } 8-2\sqrt{13}$$

[7] Divide. Rationalize the denominator and simplify, if possible. **[8 POINTS]**

$$\frac{\sqrt{5}}{\sqrt{90}}$$

$$\sqrt{\frac{5}{90}}$$

$$\sqrt{\frac{1}{18}}$$

$$\frac{1}{\sqrt{18}}$$

$$\frac{1}{3\sqrt{2}}$$

$$\frac{\sqrt{2}}{3(2)}$$

$$\frac{\sqrt{2}}{6}$$

[8] Divide. Write your answer using fractional and/or negative exponents. **[8 POINTS]**

$$\frac{\sqrt[5]{v}}{\sqrt[7]{v}}$$

$$\frac{v^{\frac{1}{5}}}{v^{\frac{1}{7}}}$$

$$v^{\frac{1}{5}-\frac{1}{7}}$$

$$v^{\frac{2}{35}}$$

[9] If the length of a leg of a right angle triangle is 7 inches, and the length of the hypoteneuse is 11 inches, find the length of the other leg. **Round your answers to 3 decimal points.** **[6 POINTS]**

$$7^2 + b^2 = 11^2$$

$$49 + b^2 = 121$$

$$b^2 = 72$$

$$b = 8.485$$

[10] Simplify. **Write your answers using radicals.**

[a] $\sqrt{18c^6t^{10}y^9}$

$\sqrt{9c^6t^{10}y^8 \cdot 2y}$

$3c^3t^5y^4\sqrt{2y}$

[b] $\sqrt{48}+\sqrt{108}$ **[14 POINTS]**

$\sqrt{16\cdot 3}+\sqrt{36\cdot 3}$

$4\sqrt{3}+6\sqrt{3}$

$10\sqrt{3}$

[c] $\sqrt{15a^5}\sqrt{10a^6}$

$\sqrt{150a^{11}}$

$\sqrt{25a^{10}\cdot 6a}$

$5a^5\sqrt{6a}$

[d] $\sqrt{15}(4\sqrt{6}-\sqrt{5})$ **[16 POINTS]**

$4\sqrt{90}-\sqrt{75}$

$4\sqrt{9\cdot 10}-\sqrt{25\cdot 3}$

$12\sqrt{10}-5\sqrt{3}$

[c] $\sqrt{75x^7}-2x^2\sqrt{27x^3}$ **[9 POINTS]**

$\sqrt{25x^6\cdot 3x}-2x^2\sqrt{9x^2\cdot 3x}$

$5x^3\sqrt{3x}-2x^2(3x)\sqrt{3x}$

$5x^3\sqrt{3x}-6x^3\sqrt{3x}$

$-x^3\sqrt{3x}$

[11] Find the distance between the points $(2,-7)$ and $(-8,-13)$. **[10 POINTS]**
Write your answer as a radical, and simplify.

$\sqrt{(-8-2)^2+(-13-7)^2}$

$\sqrt{(-10)^2+(-6)^2}$

$\sqrt{100+36}$

$\sqrt{136}$ → $2\sqrt{34}$

[12] Solve using algebra. **[25 POINTS]**

Check your answers for full credit. You must show algebraic solutions to receive credit.

[a] $28-3\sqrt{1-w}=16$

$-3\sqrt{1-w}=-12$

$\sqrt{1-w}=4$

$1-w=16$

$-w=15$

$\boxed{w=-15}$

CHECK: $28-3\sqrt{1-(-15)}=16$?

$28-3\sqrt{16}=16$?

$28-3(4)=16$?

$28-12=16$ ✓

[b] $q+\sqrt{14-q}=2$

$\sqrt{14-q}=2-q$

$14-q=(2-q)^2$

$14-q=4-4q+q^2$

$0=q^2-3q-10$

$0=(q-5)(q+2)$

~~$q=5$~~ OR $\boxed{q=-2}$

CHECK: $5+\sqrt{14-5}=2$?

$5+\sqrt{9}=2$?

$5+3=2$ ✗

$-2+\sqrt{14-(-2)}=2$?

$-2+\sqrt{16}=2$?

$-2+4=2$ ✓