Math 114
Midterm 1
Thu Oct 8, 2009

Name: _____

- **YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT**
- **IT MUST BE CLEAR HOW YOU ARRIVED AT YOUR ANSWER**
- **PUT A BOX AROUND YOUR FINAL ANSWER**

Write 0.000271 in scientific notation. **SCORE: ___ / 4 POINTS**

$\boxed{2.71 \times 10^{-4}}$

Write 3.14×10^{5} in standard notation. **SCORE: ___ / 4 POINTS**

$\boxed{314{,}000}$

Write using fractional and/or negative exponents (where applicable). **SCORE: ___ / 12 POINTS**

[a] $\left(\sqrt[5]{p}\right)^{9} = \boxed{p^{\frac{9}{5}}}$

[b] $\dfrac{1}{\sqrt{b^{7}}} = \dfrac{1}{b^{\frac{7}{2}}} = \boxed{b^{-\frac{7}{2}}}$

[c] $\sqrt[3]{n^{21}} = n^{\frac{21}{3}} = \boxed{n^{7}}$

Perform the indicated operations and simplify. **Write your final answers using fractional exponents.** **SCORE: ___ / 20 POINTS**

[a] $\dfrac{k^{\frac{6}{5}}}{k^{\frac{3}{7}}}$

$= k^{\frac{6}{5}-\frac{3}{7}}$

$= \boxed{k^{\frac{27}{35}}}$

[b] $s^{4}s^{\frac{3}{7}}$

$= s^{4+\frac{3}{7}}$

$= \boxed{s^{\frac{31}{7}}}$

[c] $\dfrac{\sqrt[6]{w}}{\sqrt[8]{w}}$

$= \dfrac{w^{\frac{1}{6}}}{w^{\frac{1}{8}}}$

$= w^{\frac{1}{6}-\frac{1}{8}}$

$= \boxed{w^{\frac{1}{24}}}$

Find the distance between the points $(-4, -2)$ and $(-1, 4)$. **Write your final answer in simplest radical form.** **SCORE: ___ / 8 POINTS**

$$\sqrt{(-1--4)^2+(4--2)^2}$$

$$=\sqrt{3^2+6^2}$$

$$=\sqrt{9+36}=\sqrt{45}=\boxed{3\sqrt{5}}$$

Find the equation of the circle with center $(-5, 2)$ and radius 8. **SCORE: ___ / 6 POINTS**

$$(x--5)^2+(y-2)^2=8^2$$

$$\boxed{(x+5)^2+(y-2)^2=64}$$

Solve the equation $13-4\sqrt{h}=5$ using algebra. **Check your answer(s).** **SCORE: ___ / 10 POINTS**

$$-4\sqrt{h}=-8$$

$$\sqrt{h}=2$$

$$\boxed{h=4}$$

CHECK: $13-4\sqrt{4}$

$=13-4(2)$

$=13-8$

$=5$

Simplify $\sqrt{294}$. **SCORE: ___ / 5 POINTS**

$$\boxed{7\sqrt{6}}$$

$2 \mid 294$

$3 \mid 147$

$7 \mid 49$

7

Perform the indicated operations and simplify. **Write your final answers using radicals.** **SCORE: ___ / 20 POINTS**

[a] $\sqrt{15g^6}\sqrt{5g^9}$

$= \sqrt{75g^{15}}$

$= \boxed{5g^7\sqrt{3g}}$

[b] $(2\sqrt{3}-\sqrt{10})(3\sqrt{6}+\sqrt{5})$

$= 6\sqrt{18} + 2\sqrt{15} - 3\sqrt{60} - \sqrt{50}$

$= 18\sqrt{2} + 2\sqrt{15} - 6\sqrt{15} - 5\sqrt{2}$

$= \boxed{13\sqrt{2} - 4\sqrt{15}}$

[c] $\sqrt{45}-\sqrt{20}$

$= 3\sqrt{5} - 2\sqrt{5}$

$= \boxed{\sqrt{5}}$

Simplify $\sqrt{45v^5r^7a^6}$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$\boxed{3v^2r^3a^3\sqrt{5vr}}$

Rationalize the denominator and simplify. **Write your final answers using radicals.** **SCORE: ___ / 14 POINTS**

[a] $\frac{8}{7\sqrt{6}}$

$= \frac{8}{7\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$

$= \frac{8\sqrt{6}}{42}$

$= \boxed{\frac{4\sqrt{6}}{21}}$

[b] $\frac{6}{3+\sqrt{7}}$

$= \frac{6}{3+\sqrt{7}} \cdot \frac{3-\sqrt{7}}{3-\sqrt{7}}$

$= \frac{6(3-\sqrt{7})}{9-7}$

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

$= 3(3-\sqrt{7}) = \boxed{9-3\sqrt{7}}$

Find the center and radius of the circle $x^2 + y^2 + 8x - 10y + 5 = 0$.

SCORE: ___ / 10 POINTS

$x^2 + 8x + 16 + y^2 - 10y + 25 = -5 + 16 + 25$

$(x+4)^2 + (y-5)^2 = 36$

CENTER $\boxed{(-4, 5)}$

RADIUS $\sqrt{36} = \boxed{6}$

Divide. Rationalize the denominator and simplify. **Write your final answers using radicals.**

SCORE: ___ / 8 POINTS

$$\frac{\sqrt{3}}{\sqrt{60}} = \sqrt{\frac{1}{20}} = \frac{1}{\sqrt{20}} = \frac{1}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{5}}{10}}$$

Solve the equation $m + \sqrt{2m+5} = 5$ using algebra. **Check your answer(s).**

SCORE: ___ / 14 POINTS

$\sqrt{2m+5} = 5 - m$

$2m + 5 = (5-m)^2$

$2m + 5 = 25 - 10m + m^2$

$0 = m^2 - 12m + 20$

$0 = (m-2)(m-10)$

$m - 2 = 0$ OR $m - 10 = 0$

$\boxed{m = 2}$ OR ~~$m = 10$~~

CHECK:

$m = 2$

$2 + \sqrt{2(2)+5}$

$= 2 + \sqrt{9}$

$= 2 + 3$

$= 5$ ✓

$m = 10$

$10 + \sqrt{2(10)+5}$

$= 10 + \sqrt{25}$

$= 10 + 5$

$= 15$ ×