Math 114
Midterm 1
Thu Apr 23, 2009

YELLOW

Name: _____

YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT

PUT A BOX AROUND YOUR FINAL ANSWER

Write 1.97×10^{-5} in standard notation.

SCORE: ___ / 4 POINTS

0.0000197

Write $81{,}700{,}000$ in scientific notation.

SCORE: ___ / 4 POINTS

8.17×10^{7}

Write using fractional and/or negative exponents (where applicable).

SCORE: ___ / 12 POINTS

[a] $\left(\sqrt[4]{n}\right)^5 = n^{\frac{5}{4}}$

[b] $\sqrt[7]{b^{21}} = b^{\frac{21}{7}} = b^3$

[c] $\dfrac{1}{\sqrt{p^9}} = p^{-\frac{9}{2}}$

Perform the indicated operations and simplify. **Write your final answers using fractional exponents.**

SCORE: ___ / 20 POINTS

[a] $k^5 k^{\frac{3}{4}} = k^{5+\frac{3}{4}} = k^{\frac{20+3}{4}} = k^{\frac{23}{4}}$

[b] $\dfrac{w^{\frac{4}{5}}}{w^{\frac{2}{3}}} = w^{\frac{4}{5}-\frac{2}{3}} = w^{\frac{12-10}{15}} = w^{\frac{2}{15}}$

[c] $\dfrac{\sqrt[4]{s}}{\sqrt[10]{s}} = \dfrac{s^{\frac{1}{4}}}{s^{\frac{1}{10}}} = s^{\frac{1}{4}-\frac{1}{10}} = s^{\frac{5-2}{20}} = s^{\frac{3}{20}}$

Simplify $\sqrt{180}$.

SCORE: ___ / 5 POINTS

$6\sqrt{5}$

2 | 180
2 | 90
3 | 45
3 | 15
5 | 5
1

Find the equation of the circle with center $(3,-7)$ and radius 9.

SCORE: ___ / 6 POINTS

$(x-3)^2+(y+7)^2=81$

Find the distance between the points $(7,-8)$ and $(-1,-4)$. **Write your final answer in simplest radical form.**

SCORE: ___ / 8 POINTS

$\sqrt{(7--1)^2+(-8--4)^2}$

$=\sqrt{8^2+4^2}$

$=\sqrt{64+16}$

$=\sqrt{80}$

$=4\sqrt{5}$

Solve the equation $14-3\sqrt{g}=2$ using algebra. **Check your answer(s).**

SCORE: ___ / 10 POINTS

$-3\sqrt{g}=-12$

$\sqrt{g}=4$

$(\sqrt{g})^2=4^2$

$g=16$

CHECK: $14-3\sqrt{16}$

$=14-3(4)$

$=14-12$

$=2$ YES

Simplify $\sqrt{72r^7a^9v^8}$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$$6r^3a^4v^4\sqrt{2ra}$$

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

[a] $\dfrac{8}{3\sqrt{10}} = \dfrac{8}{3\sqrt{10}} \cdot \dfrac{\sqrt{10}}{\sqrt{10}}$

$= \dfrac{8\sqrt{10}}{30}$

$= \dfrac{4\sqrt{10}}{15}$

[b] $\dfrac{10}{4-\sqrt{11}} = \dfrac{10}{4-\sqrt{11}} \cdot \dfrac{4+\sqrt{11}}{4+\sqrt{11}}$

$= \dfrac{10(4+\sqrt{11})}{16-11}$

$= \dfrac{10(4+\sqrt{11})}{5}$

$= 2(4+\sqrt{11})$

$= 8+2\sqrt{11}$

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

[a] $\sqrt{48}+\sqrt{75}$

$= 4\sqrt{3}+5\sqrt{3}$

$= 9\sqrt{3}$

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

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

$= 6\sqrt{15}+10\sqrt{2}-9\sqrt{2}-2\sqrt{15}$

$= 4\sqrt{15}+\sqrt{2}$

[c] $\sqrt{2h^5}\sqrt{12h^8}$

$= \sqrt{24h^{13}}$

$= 2h^6\sqrt{6h}$

Divide. Rationalize the denominator and simplify. **Write your final answers using radicals.** **SCORE: ___ / 8 POINTS**

$$\frac{\sqrt{3}}{\sqrt{54}} = \sqrt{\frac{3}{54}} = \sqrt{\frac{1}{18}} = \frac{\sqrt{1}}{\sqrt{18}} = \frac{1}{3\sqrt{2}} = \frac{1}{3\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \boxed{\frac{\sqrt{2}}{6}}$$

Find the center and radius of the circle $x^2 + y^2 - 10x + 12y + 12 = 0$. **SCORE: ___ / 10 POINTS**

$$x^2 - 10x + 25 + y^2 + 12y + 36 = -12 + 25 + 36$$

$$(x-5)^2 + (y+6)^2 = 49$$

CENTER: $(5, -6)$

RADIUS: 7

Solve the equation $m - \sqrt{2m-1} = 2$ using algebra. **Check your answer(s).** **SCORE: ___ / 14 POINTS**

$$-\sqrt{2m-1} = 2 - m$$

$$\left(-\sqrt{2m-1}\right)^2 = (2-m)^2$$

$$2m - 1 = 4 - 4m + m^2$$

$$0 = m^2 - 6m + 5$$

$$0 = (m-1)(m-5)$$

~~$m = 1$~~ OR $\boxed{m = 5}$

CHECK:

$m = 1$: $1 - \sqrt{2(1)-1} = 1 - \sqrt{1} = 1 - 1 = 0$ NO

$m = 5$: $5 - \sqrt{2(5)-1} = 5 - \sqrt{9} = 5 - 3 = 2$ YES