Math 114 (7:30am – 8:20am)
Midterm 2 Version I
Wed Nov 9, 2011

Name you asked to be called: _____

SCORE: _____ / 140 POINTS

- **YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT (NO GUESS & CHECK)**
- **IT MUST BE CLEAR HOW YOU ARRIVED AT YOUR ANSWER**
- **PUT A BOX AROUND YOUR FINAL ANSWER**
- **ALL FINAL ANSWERS WHICH ARE RADICALS MUST BE SIMPLIFIED**
- **ALL FRACTIONS MUST BE IN SIMPLEST FORM**

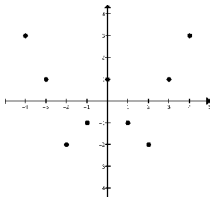
Write using fractional and/or negative exponents (where applicable). **SCORE: ___ / 8 POINTS**

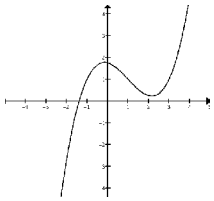
[a] $(\sqrt[3]{n})^8 = n^{\frac{8}{3}}$ [b] $\sqrt{b^9} = b^{\frac{9}{2}}$ [c] $\frac{1}{\sqrt[6]{n^{24}}} = n^{-\frac{24}{6}} = n^{-4}$

Find the equation of the circle with center $(25, -1)$ and radius 4. **SCORE: ___ / 6 POINTS**

$$(x-25)^2 + (y-(-1))^2 = 4^2$$
$$(x-25)^2 + (y+1)^2 = 16$$

Circle the **two** graphs below that represent functions. **SCORE: ___ / 6 POINTS**





Simplify $\sqrt{56r^9a^{16}v^{11}}$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$$2r^4a^8v^5\sqrt{14rv}$$

Simplify $\sqrt{504}$. **SCORE: ___ / 6 POINTS**

$$504 = 2\times2\times2\times3\times3\times7$$
$$\sqrt{504} = 2\times3\sqrt{2\times7} = 6\sqrt{14}$$

Find the center and radius of the circle $x^2 + y^2 - 10x + 18y + 42 = 0$. **SCORE: ___ / 8 POINTS**

$$x^2 - 10x + y^2 + 18y = -42$$
$$x^2 - 10x + 25 + y^2 + 18y + 81 = -42 + 25 + 81$$
$$(x-5)^2 + (y+9)^2 = 64$$

CENTER = $(5, -9)$

RADIUS = 8

Perform the indicated operations and simplify. **Write your final answers using radicals.** **SCORE: ___ / 14 POINTS**

[a] $\sqrt{6g^{11}}\sqrt{21g^9}$

$$= \sqrt{126g^{20}}$$
$$= 3g^{10}\sqrt{14}$$

[b] $(\sqrt{5} + 4\sqrt{2})(3\sqrt{6} - \sqrt{15})$

$$= 3\sqrt{30} - \sqrt{75} + 12\sqrt{12} - 4\sqrt{30}$$
$$= 3\sqrt{30} - 5\sqrt{3} + 12(2\sqrt{3}) - 4\sqrt{30}$$
$$= -5\sqrt{3} + 24\sqrt{3} - \sqrt{30}$$
$$= 19\sqrt{3} - \sqrt{30}$$

Perform the indicated operations and simplify. **Write your final answers using fractional exponents.** **SCORE: ___ / 8 POINTS**

[a] $\dfrac{\sqrt[6]{w}}{\sqrt[10]{w}}$

$$= \frac{w^{\frac{1}{6}}}{w^{\frac{1}{10}}}$$
$$= w^{\frac{1}{6} - \frac{1}{10}}$$
$$= w^{\frac{1}{15}}$$

[b] $k^6 k^{\frac{3}{8}}$

$$= k^{6 + \frac{3}{8}}$$
$$= k^{\frac{51}{8}}$$

Rationalize the denominator and simplify. **SCORE: ___ / 12 POINTS**

[a] $\dfrac{14}{5\sqrt{21}}$

$$= \frac{14}{5\sqrt{21}} \frac{\sqrt{21}}{\sqrt{21}}$$
$$= \frac{14\sqrt{21}}{5(21)}$$
$$= \frac{2\sqrt{21}}{5(3)} \qquad = \frac{2\sqrt{21}}{15}$$

[b] $\dfrac{15}{7 + \sqrt{13}}$

$$= \frac{15}{7 + \sqrt{13}} \frac{7 - \sqrt{13}}{7 - \sqrt{13}}$$
$$= \frac{15(7 - \sqrt{13})}{49 - 13}$$
$$= \frac{15(7 - \sqrt{13})}{36} \qquad = \frac{5(7 - \sqrt{13})}{12}$$

Find the distance between the points $(1,-3)$ and $(-2,-9)$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$$\sqrt{(-2-1)^2+(-9-(-3))^2} = \sqrt{(-3)^2+(-6)^2} = \sqrt{9+36} = \sqrt{45} = 3\sqrt{5}$$

Divide. Rationalize the denominator and simplify. **SCORE: ___ / 6 POINTS**

$$\frac{\sqrt{21}}{\sqrt{56x}}$$

$$= \frac{\sqrt{7}\sqrt{3}}{\sqrt{7}\sqrt{8x}} = \frac{\sqrt{3}}{\sqrt{8x}} = \frac{\sqrt{3}}{2\sqrt{2x}} = \frac{\sqrt{3}}{2\sqrt{2x}}\frac{\sqrt{2x}}{\sqrt{2x}} = \frac{\sqrt{6x}}{4x}$$

Translate the following sentence into an absolute value equation or inequality. **SCORE: ___ / 6 POINTS**

"x is no less than 9 away from 5"

The distance between x and 5 is greater than or equal to 9

$|x-5| \geq 9$

If $f(x) = 2x^2 - 6x - 5$, find $f(a-3)$. **SCORE: ___ / 8 POINTS**

$$\begin{aligned} & 2(a-3)^2 - 6(a-3) - 5 \\ = \; & 2(a^2 - 6a + 9) - 6a + 18 - 5 \\ = \; & 2a^2 - 12a + 18 - 6a + 18 - 5 \\ = \; & 2a^2 - 18a + 31 \end{aligned}$$

The equation $5 - |9 - 3x| = 2$ has two solutions. One solution is $x = 2$. Find the other solution. **SCORE: ___ / 8 POINTS**

Check your answer.

$$-|9-3x| = -3$$

$$|9-3x| = 3$$

$$9-3x = 3 \quad \text{OR} \quad 9-3x = -3$$

$$-3x = -6 \quad \text{OR} \quad -3x = -12$$

$$x = 2 \quad \text{OR} \quad \boxed{x = 4}$$

CHECK:

$$5 - |9 - 3(4)| = 5 - |9 - 12| = 5 - |-3| = 5 - 3 = 2$$

Solve the equation $13-4\sqrt{1-h}=5$ using algebra. **Check your answer(s).** **SCORE: ___ / 10 POINTS**

$-4\sqrt{1-h}=-8$
$\sqrt{1-h}=2$
$1-h=4$
$-h=3$
$\boxed{h=-3}$

CHECK:
$13-4\sqrt{1-(-3)} \;=\; 13-4\sqrt{4} \;=\; 13-4(2) \;=\; 13-8 \;=\; 5$

Solve the equation $m+\sqrt{7-2m}=2$ using algebra. **Check your answer(s).** **SCORE: ___ / 12 POINTS**

$\sqrt{7-2m}=2-m$
$7-2m=(2-m)^2$
$7-2m=4-4m+m^2$
$0=m^2-2m-3$
$0=(m-3)(m+1)$
$m=3$ OR $\boxed{m=-1}$

CHECK:
$m=3$
$3+\sqrt{7-2(3)} \;=\; 3+\sqrt{7-6} \;=\; 3+\sqrt{1} \;=\; 3+1 \;=\; 4$
$m=-1$
$-1+\sqrt{7-2(-1)} \;=\; -1+\sqrt{7+2} \;=\; -1+\sqrt{9} \;=\; -1+3 \;=\; 2$

Solve $|11-2x|\geq 3$. **SCORE: ___ / 10 POINTS**

The distance between 11 and $2x$ is greater than or equal to 3
$2x\leq 8$ OR $2x\geq 14$
$x\leq 4$ OR $x\geq 7$

OR

$11-2x\leq -3$ OR $11-2x\geq 3$
$-2x\leq -14$ OR $-2x\geq -8$
$x\geq 7$ OR $x\leq 4$