Math 114 (8:30am – 9:20am)
Midterm 2 Version S
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**

Find the distance between the points $(-6,-3)$ and $(1,-4)$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$$\sqrt{(1-(-6))^2+(-4-(-3))^2} = \sqrt{7^2+(-1)^2} = \sqrt{49+1} = \sqrt{50} = 5\sqrt{2}$$

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

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

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

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

"x is no more than 8 away from 4"

The distance between x and 4 is less than or equal to 8

$|x-4| \le 8$

If $f(x) = 2x^2 - 5x - 6$, find $f(a-4)$. **SCORE: ___ / 8 POINTS**

$$\begin{aligned} & 2(a-4)^2 - 5(a-4) - 6 \\ = \; & 2(a^2 - 8a + 16) - 5a + 20 - 6 \\ = \; & 2a^2 - 16a + 32 - 5a + 20 - 6 \\ = \; & 2a^2 - 21a + 46 \end{aligned}$$

The equation $7-|11-3x|=2$ has two solutions. One solution is $x=2$. Find the other solution. **SCORE: ___ / 8 POINTS**

Check your answer.

$-|11-3x|=-5$

$|11-3x|=5$

$11-3x=5$ OR $11-3x=-5$

$-3x=-6$ OR $-3x=-16$

$x=2$ OR $\boxed{x=\frac{16}{3}}$

CHECK:

$$7-\left|11-3\left(\frac{16}{3}\right)\right| = 7-|11-16| = 7-|-5| = 7-5 = 2$$

Solve the equation $11-3\sqrt{2-h}=5$ using algebra. **Check your answer(s).** **SCORE: ___ / 10 POINTS**

$-3\sqrt{2-h}=-6$

$\sqrt{2-h}=2$

$2-h=4$

$-h=2$

$\boxed{h=-2}$

CHECK:

$$11-3\sqrt{2-(-2)} = 11-3\sqrt{4} = 11-3(2) = 11-6 = 5$$

Solve the equation $m+\sqrt{16-5m}=2$ using algebra. **Check your answer(s).** **SCORE: ___ / 12 POINTS**

$\sqrt{16-5m}=2-m$

$16-5m=(2-m)^2$

$16-5m=4-4m+m^2$

$0=m^2+m-12$

$0=(m-3)(m+4)$

$m=3$ OR $\boxed{m=-4}$

CHECK:

$m=3$

$$3+\sqrt{16-5(3)} = 3+\sqrt{16-15} = 3+\sqrt{1} = 3+1 = 4$$

$m=-4$

$$-4+\sqrt{16-5(-4)} = -4+\sqrt{16+20} = -4+\sqrt{36} = -4+6 = 2$$

Solve $|7-4x| \geq 5$.

SCORE: ___ / 10 POINTS

The distance between 7 and $4x$ is greater than or equal to 5

$4x \leq 2$ OR $4x \geq 12$

$x \leq \frac{1}{2}$ OR $x \geq 3$

OR

$7-4x \leq -5$ OR $7-4x \geq 5$

$-4x \leq -12$ OR $-4x \geq -2$

$x \leq \frac{1}{2}$ OR $x \geq 3$

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

SCORE: ___ / 8 POINTS

[a] $(\sqrt[6]{n})^{24} = n^4$

[b] $\sqrt[5]{b^{13}} = b^{\frac{13}{5}}$

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

Find the equation of the circle with center $(-4, 16)$ and radius 9.

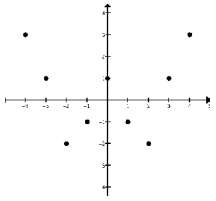
SCORE: ___ / 6 POINTS

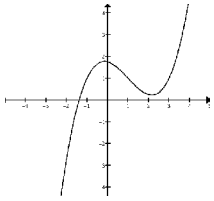
$(x-(-4))^2 + (y-16)^2 = 9^2$

$(x+4)^2 + (y-16)^2 = 81$

Circle the **<u>two</u>** graphs below that represent functions.

SCORE: ___ / 6 POINTS





Simplify $\sqrt{60r^{16}a^{13}v^9}$. **<u>Write your final answer using radicals.</u>**

SCORE: ___ / 6 POINTS

$2r^8a^6v^4\sqrt{15av}$

Simplify $\sqrt{588}$.

SCORE: ___ / 6 POINTS

$588 = 2 \times 2 \times 3 \times 7 \times 7$

$\sqrt{588} = 2 \times 7\sqrt{3} = 14\sqrt{3}$

Find the center and radius of the circle $x^2 + y^2 - 14x + 12y + 4 = 0$. **SCORE: ___ / 8 POINTS**

$$x^2 - 14x + y^2 + 12y = -4$$
$$x^2 - 14x + 49 + y^2 + 12y + 36 = -4 + 49 + 36$$
$$(x-7)^2 + (y+6)^2 = 81$$

CENTER = $(7, -6)$
RADIUS = 9

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

[a] $\sqrt{10g^5}\sqrt{15g^{11}}$

$= \sqrt{150g^{16}}$
$= 5g^8\sqrt{6}$

[b] $(4\sqrt{5} + \sqrt{3})(\sqrt{6} - 2\sqrt{10})$

$= 4\sqrt{30} - 8\sqrt{50} + \sqrt{18} - 2\sqrt{30}$
$= 4\sqrt{30} - 8(5\sqrt{2}) + 3\sqrt{2} - 2\sqrt{30}$
$= 2\sqrt{30} - 40\sqrt{2} + 3\sqrt{2}$
$= 2\sqrt{30} - 37\sqrt{2}$

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

[a] $\dfrac{\sqrt[6]{w}}{\sqrt[15]{w}}$

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

[b] $k^8 k^{\frac{5}{6}}$

$= k^{8+\frac{5}{6}}$
$= k^{\frac{53}{6}}$

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

[a] $\dfrac{10}{7\sqrt{15}}$

$= \dfrac{10}{7\sqrt{15}}\dfrac{\sqrt{15}}{\sqrt{15}}$
$= \dfrac{10\sqrt{15}}{7(15)}$
$= \dfrac{2\sqrt{15}}{7(3)}$ $= \dfrac{2\sqrt{15}}{21}$

[b] $\dfrac{33}{6+\sqrt{14}}$

$= \dfrac{33}{6+\sqrt{14}}\dfrac{6-\sqrt{14}}{6-\sqrt{14}}$
$= \dfrac{33(6-\sqrt{14})}{36-14}$
$= \dfrac{33(6-\sqrt{14})}{22}$ $= \dfrac{3(6-\sqrt{14})}{2}$