Math 114
Midterm
Wed Nov 3, 2010

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 center and radius of the circle $x^2 + y^2 + 14x - 6y + 2 = 0$. **SCORE: ___ / 10 POINTS**

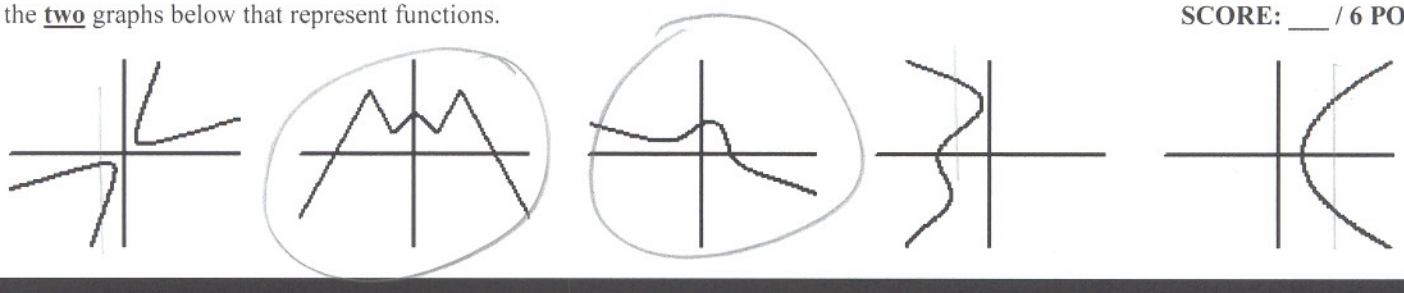
$x^2+14x+49+y^2-6y+9=-2+49+9$

$(x+7)^2+(y-3)^2=56$

CENTER $=(-7,3)$

RADIUS $=\sqrt{56}=2\sqrt{14}$

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



Simplify $\sqrt{450}$. **SCORE: ___ / 6 POINTS**

$2\,|\,450$
$3\,|\,225$
$3\,|\,75$
$5\,|\,25$
$5\,|\,5$
1

$15\sqrt{2}$

Find the equation of the circle with center $(7, -5)$ and radius 4. **SCORE: ___ / 6 POINTS**

$(x-7)^2+(y-(-5))^2=4^2$

$(x-7)^2+(y+5)^2=16$

Perform the indicated operations and simplify. **Write your final answers using fractional exponents.** **SCORE: ___ / 10 POINTS**

[a] $\dfrac{\sqrt[8]{w}}{\sqrt[10]{w}} = \dfrac{w^{\frac{1}{8}}}{w^{\frac{1}{10}}} = w^{\frac{1}{8}-\frac{1}{10}} = w^{\frac{5-4}{40}} = \boxed{w^{\frac{1}{10}}}$

[b] $k^9 k^{\frac{5}{6}} = k^{9+\frac{5}{6}} = \boxed{k^{\frac{59}{6}}}$

Simplify $\sqrt{48r^{16}a^9v^5}$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$= \sqrt{48}\sqrt{r^{16}}\sqrt{a^9}\sqrt{v^5}$

$= 4\sqrt{3}\, r^8 a^4\sqrt{a}\, v^2\sqrt{v}$

$= \boxed{4r^8a^4v^2\sqrt{3av}}$

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

[a] $\dfrac{6}{5\sqrt{14}} \cdot \dfrac{\sqrt{14}}{\sqrt{14}}$

$= \dfrac{6\sqrt{14}}{5\cdot 14}$

$= \boxed{\dfrac{3\sqrt{14}}{35}}$

[b] $\dfrac{15}{5-\sqrt{7}} \cdot \dfrac{5+\sqrt{7}}{5+\sqrt{7}}$

$= \dfrac{15(5+\sqrt{7})}{25-7}$

$= \dfrac{15(5+\sqrt{7})}{18}$

$= \boxed{\dfrac{5(5+\sqrt{7})}{6} \text{ or } \dfrac{25+5\sqrt{7}}{6}}$

Find the distance between the points $(-2,-5)$ and $(4,-1)$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$\sqrt{(4--2)^2+(-1--5)^2}$

$= \sqrt{6^2+4^2}$

$= \sqrt{36+16}$

$= \sqrt{52} = \boxed{2\sqrt{13}}$

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

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

Solve the equation $17 - 3\sqrt{h} = 2$ using algebra. **Check your answer(s).** **SCORE: ___ / 8 POINTS**

$-3\sqrt{h} = -15$

$\sqrt{h} = 5$

$\boxed{h = 25}$

CHECK: $17 - 3\sqrt{25}$

$= 17 - 3(5)$

$= 17 - 15$

$= 2$ ✓

If $f(x) = 3x^2 - 5x - 2$, find $f(a-1)$. **SCORE: ___ / 8 POINTS**

$f(a-1) = 3(a-1)^2 - 5(a-1) - 2$

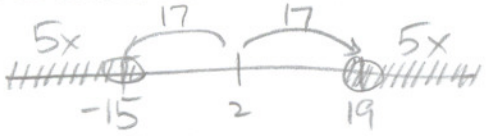
$= 3(a^2 - 2a + 1) - 5a + 5 - 2$

$= 3a^2 - 6a + 3 - 5a + 5 - 2$

$= \boxed{3a^2 - 11a + 6}$

Solve $|2 - 5x| \geq 17$. **SCORE: ___ / 10 POINTS**

DISTANCE BETWEEN 2 AND 5x IS MORE THAN OR EQUAL TO 17



$5x \leq -15$ OR $5x \geq 19$

$\boxed{x \leq -3 \text{ OR } x \geq \frac{19}{5}}$

OR

$2 - 5x \geq 17$ OR $-(2 - 5x) \geq 17$

$-5x \geq 15$ OR $-2 + 5x \geq 17$

$x \leq -3$ OR $5x \geq 19$

$\boxed{x \leq -3 \text{ OR } x \geq \frac{19}{5}}$

Solve the equation $m+\sqrt{9-4m}=1$ using algebra. **Check your answer(s).** **SCORE: ___ / 12 POINTS**

$\sqrt{9-4m}=1-m$

$9-4m=1-2m+m^2$

$0=m^2+2m-8$

$0=(m+4)(m-2)$

$m=-4$ ✗

$m=2$ ✓

CHECK: $m=-4$

$-4+\sqrt{9-4(-4)}$

$=-4+\sqrt{25}$

$=-4+5$

$=1$ ✓

$m=2$

$2+\sqrt{9-4(2)}$

$=2+\sqrt{1}$

$=2+1$

$=3$ ✗

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

[a] $\sqrt{12g^7}\sqrt{8g^6}$

$=(2g^3\sqrt{3g})(2g^3\sqrt{2})$

$=4g^6\sqrt{6g}$

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

$=4\sqrt{30}-2\sqrt{75}+2\sqrt{12}-\sqrt{30}$

$=3\sqrt{30}-2(5\sqrt{3})+2(2\sqrt{3})$

$=3\sqrt{30}-10\sqrt{3}+4\sqrt{3}$

$=3\sqrt{30}-6\sqrt{3}$

Write using fractional and/or negative exponents (where applicable). **SCORE: ___ / 10 POINTS**

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

[b] $\sqrt[3]{b^{17}}=b^{\frac{17}{3}}$

[c] $\frac{1}{\sqrt{p^5}}=\frac{1}{p^{\frac{5}{2}}}=p^{-\frac{5}{2}}$

The equation $9-|8-x|=4$ has 2 solutions. One solution is $x=3$. Find the other solution. **SCORE: ___ / 10 POINTS**

Check your answer.

$-|8-x|=-5$

$|8-x|=5$

$8-x=5$ OR $-(8-x)=5$

$-x=-3$ OR $-8+x=5$

$x=3$ OR $x=13$

CHECK: $9-|8-13|$

$=9-|-5|$

$=9-5$

$=4$ ✓