Math 114
Midterm 2
Wed May 19, 2010

Name: _____

SCORE: _____ / 140 POINTS

- 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
- ALL FINAL ANSWERS WHICH ARE RADICALS MUST BE SIMPLIFIED
- ALL FRACTIONS MUST BE IN SIMPLEST FORM

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

$(x-6)^2 + (y--7)^2 = 4^2$

$\boxed{(x-6)^2 + (y+7)^2 = 16}$

Simplify $\sqrt{540}$. SCORE: ___ / 6 POINTS

$2|540$
$2|270$
$3|135$
$3|45$
$3|15$
$5|5$
1

$\boxed{6\sqrt{15}}$

OR $\sqrt{36}\sqrt{15} = 6\sqrt{15}$

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

[a] $(\sqrt[3]{n})^8 = \boxed{n^{\frac{8}{3}}}$

[b] $\sqrt[5]{b^{35}} = b^{\frac{35}{5}} = \boxed{b^7}$

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

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

[a] $\frac{\sqrt[6]{w}}{\sqrt[8]{w}} = \frac{w^{\frac{1}{6}}}{w^{\frac{1}{8}}}$

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

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

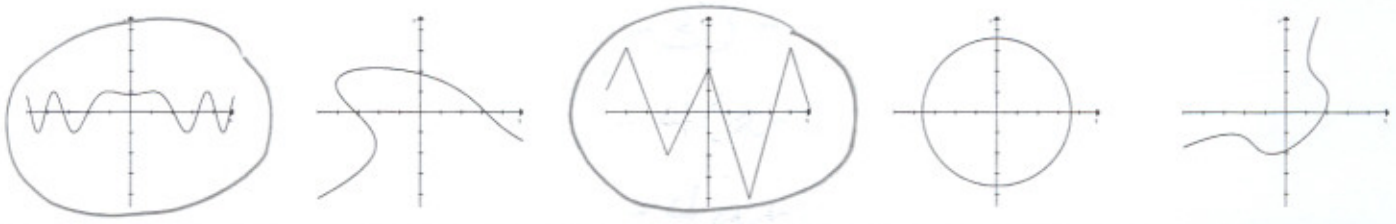
[b] $k^6 k^{\frac{3}{4}} = k^{6+\frac{3}{4}}$

$= \boxed{k^{\frac{27}{4}}}$

If $f(x) = 2x^2 - 4x - 1$, find $f(a-3)$. **SCORE: ___ / 8 POINTS**

$$f(a-3) = 2(a-3)^2 - 4(a-3) - 1$$
$$= 2(a^2 - 6a + 9) - 4(a-3) - 1$$
$$= 2a^2 - 12a + 18 - 4a + 12 - 1$$
$$= \boxed{2a^2 - 16a + 29}$$

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



Solve $|5 - 2x| \geq 11$. **SCORE: ___ / 10 POINTS**

$$5 - 2x \geq 11 \text{ OR } 5 - 2x \leq -11$$
$$-2x \geq 6 \text{ OR } -2x \leq -16$$
$$\boxed{x \leq -3 \text{ OR } x \geq 8}$$

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

[a] $\sqrt{20g^5}\sqrt{3g^8}$

$$= \sqrt{60g^{13}}$$
$$= \boxed{2g^6\sqrt{15g}}$$

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

$$= 4\sqrt{15} - 6 + 2\sqrt{75} - \sqrt{45}$$
$$= 4\sqrt{15} - 6 + 2(5\sqrt{3}) - 3\sqrt{5}$$
$$= \boxed{4\sqrt{15} - 3\sqrt{5} + 10\sqrt{3} - 6}$$

Simplify $\sqrt{20r^7a^4v^9}$. **Write your final answer using radicals.** **SCORE: ___ / 6 POINTS**

$$2r^3a^2v^4\sqrt{5rv}$$

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

[a] $\frac{4}{5\sqrt{6}} = \frac{4}{5\sqrt{6}}\cdot\frac{\sqrt{6}}{\sqrt{6}}$

$= \frac{2\cancel{4}\sqrt{6}}{\cancel{30}\,15}$

$= \boxed{\frac{2\sqrt{6}}{15}}$

[b] $\frac{8}{5+\sqrt{3}} = \frac{8}{5+\sqrt{3}}\cdot\frac{5-\sqrt{3}}{5-\sqrt{3}}$

$= \frac{8(5-\sqrt{3})}{25-3}$

$= \frac{\cancel{8}^{4}(5-\sqrt{3})}{\cancel{22}\,11}$

$= \boxed{\frac{20-4\sqrt{3}}{11}}$

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

$\sqrt{(-6--4)^2+(1--5)^2}$

$= \sqrt{(-2)^2+(6)^2}$

$= \sqrt{40} = \boxed{2\sqrt{10}}$

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

$-2\sqrt{h} = -14$

$\sqrt{h} = 7$

$\boxed{h = 49}$

CHECK: $17-2\sqrt{49}$

$= 17-2(7)$

$= 17-14$

$= 3$

Find the center and radius of the circle $x^2 + y^2 + 12x - 8y + 48 = 0$.

SCORE: ___ / 10 POINTS

$x^2+12x+36+y^2-8y+16 = -48+36+16$

$(x+6)^2 + (y-4)^2 = 4$

CENTER: $(-6, 4)$

RADIUS: $\sqrt{4} = 2$

Solve the equation $m + \sqrt{7-m} = 1$ using algebra. **Check your answer(s).**

SCORE: ___ / 12 POINTS

$\sqrt{7-m} = 1-m$

$7-m = (1-m)^2$

$7-m = 1-2m+m^2$

$0 = m^2-m-6$

$0 = (m-3)(m+2)$

$m = 3, -2$

CHECK:

$m=3: 3+\sqrt{7-3} = 3+\sqrt{4} = 3+2 = 5$ ✗

$m=-2: -2+\sqrt{7-(-2)} = -2+\sqrt{9}$

$= -2+3$

$= 1$ ✓

$\boxed{m=-2}$

Divide. Rationalize the denominator and simplify.

SCORE: ___ / 6 POINTS

$$\frac{\sqrt{2}}{\sqrt{40}} = \sqrt{\frac{2}{40}} = \sqrt{\frac{1}{20}} = \frac{1}{\sqrt{20}} = \frac{1}{2\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \boxed{\frac{\sqrt{5}}{10}}$$

Solve $3 + |4 - x| = 9$. **Check your answer(s).**

SCORE: ___ / 10 POINTS

$|4-x| = 6$

$4-x = 6$ OR $4-x = -6$

$-x = 2$ OR $-x = -10$

$\boxed{x = -2 \text{ OR } x = 10}$

CHECK:

$x=-2: 3+|4-(-2)| = 3+|6|$

$= 9$ ✓

$x=10: 3+|4-10| = 3+|-6|$

$= 9$ ✓