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 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 $3+|4-x|=9$. **Check your answer(s).** SCORE: ___ / 10 POINTS

$$|4-x|=6$$
$$4-x=6 \text{ OR } 4-x=-6$$
$$-x=2 \text{ OR } -x=-10$$
$$\boxed{x=-2 \text{ OR } x=10}$$

CHECK:

$x=-2$: $3+|4-(-2)|=3+|6|=9$ ✓

$x=10$: $3+|4-10|=3+|-6|=9$ ✓

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

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

OR

$540 = 2^2 \cdot 3^3 \cdot 5$

$6\sqrt{15}$

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

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

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

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

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

[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**

$f(a-3) = 2(a-3)^2 - 4(a-3) - 1$

$= 2(a^2 - 6a + 9) - 4(a-3) - 1$

$= 2a^2 - 12a + 18 - 4a + 12 - 1$

$= \boxed{2a^2 - 16a + 29}$

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

$5 - 2x \geq 11$ OR $5 - 2x \leq -11$

$-2x \geq 6$ OR $-2x \leq -16$

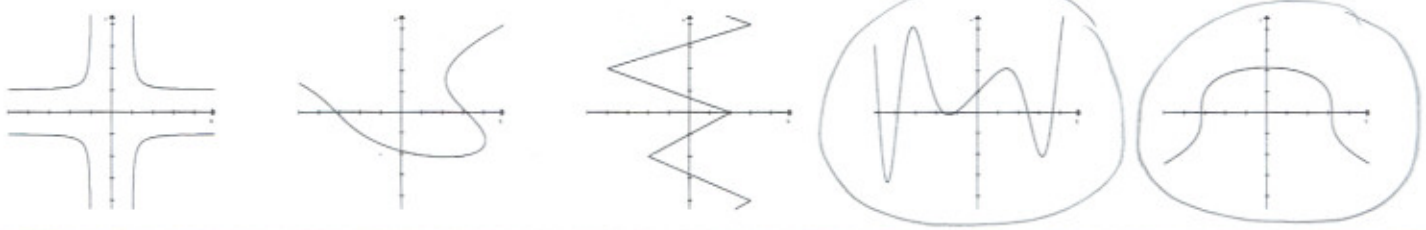
$\boxed{x \leq -3 \text{ OR } x \leq 8}$

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

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

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

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



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

$= 4\sqrt{15}-6+2\sqrt{75}-\sqrt{45}$

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

$= \boxed{4\sqrt{15}-3\sqrt{5}+10\sqrt{3}-6}$

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

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

$= \frac{4\sqrt{6}}{30}$

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

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

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

$= \frac{8(5-\sqrt{3})}{22}$

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

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

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

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

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

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: $\boxed{(-6, 4)}$

RADIUS: $\sqrt{4} = \boxed{2}$

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:

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

$m = -2$: $-2 + \sqrt{7-2} = -2 + \sqrt{9} = 1$ ✓

$\boxed{m = -2}$