**Math 114**
**Absolute Value, Radicals, Rational Exponents & Functions (Intro) Review**

[1] [a] If $f(x) = x^2 + 3x - 5$, find $f(-2)$.

[b] If $f(x) = \dfrac{2x}{x^2+1}$, find $f(3)$.

[c] If $f(x) = 5 - 2\sqrt{4-x}$, find $f(-5)$.

[2] [a] If $f(x) = 2 - 3x - x^2$, find $f(a-1)$.

[b] If $f(x) = 2x^2 + 5x + 1$, find $f(a+3)$.

[3] Which of the following are functions ?

[a]

| $x$ | 2 | 5 | 8 | 9 |
|---|---|---|---|---|
| $f(x)$ | 3 | -2 | -2 | 1 |

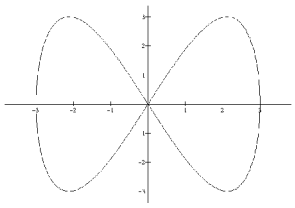
[b]

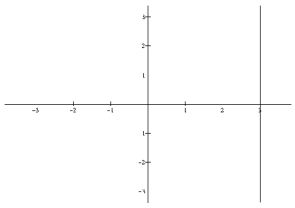
| $x$ | 6 | 4 | 7 | 4 |
|---|---|---|---|---|
| $f(x)$ | 3 | -2 | 4 | 1 |

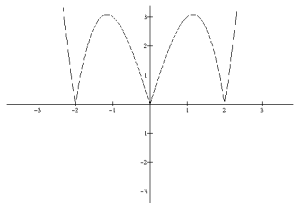
[c]

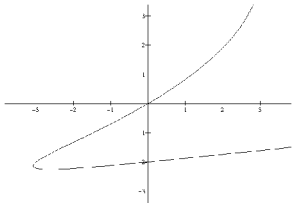
| $x$ | -1 | 3 | 0 | 10 |
|---|---|---|---|---|
| $f(x)$ | -1 | 3 | 0 | 10 |

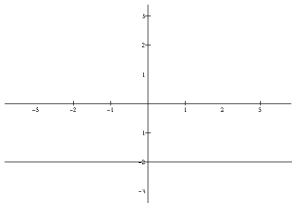
[4] Which of the following graphs represent functions ?

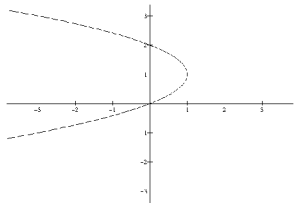
[a] 

[b] 

[c] 

[d] 

[e] 

[f] 

[5] Write using fractional and/or negative exponents wherever possible, and simplify.

[a] $\sqrt[5]{j^8}$ [b] $(\sqrt[4]{e})^{11}$ [c] $\sqrt{w^5}$ [d] $(\sqrt{f})^9$

[e] $\sqrt[7]{z}$ [f] $\left(\dfrac{1}{\sqrt{u}}\right)^5$

[6] Simplify. Write your answers using radicals, except problems marked (*) (use fractional exponents for only those problems).

[a] $\sqrt{98}$ [b] $\sqrt{108}$ [c] $\sqrt{q^{14}}$ [d] $\sqrt[6]{h^{24}}$

[e](*) $\left(c^{\frac{2}{3}}\right)^{\frac{6}{5}}$ [f](*) $t^{\frac{2}{5}}t^{\frac{1}{3}}$ [g](*) $\dfrac{a^{\frac{2}{3}}}{a^{\frac{1}{5}}}$ [h] $(49y^{-6})^{\frac{1}{2}}$

[i](*) $m^6 m^{\frac{2}{3}}$ [j](*) $r^{\frac{3}{4}}r$ [k] $5\sqrt{7} + 8\sqrt{7}$ [l] $2\sqrt{6} - 7\sqrt{6}$

[m] $\sqrt{108} - \sqrt{48}$ [n](*) $\sqrt{50x^7} - 3x\sqrt{8x^5}$ [o] $\sqrt{3}(4\sqrt{3} - \sqrt{6})$ [p] $\sqrt{30}\sqrt{18}$

[q] $(\sqrt{2} + 2\sqrt{3})(4\sqrt{3} - \sqrt{6})$

[7] Rationalize the denominator, and simplify.

[a] $\dfrac{1}{3\sqrt{5}}$ [b] $\dfrac{4}{7\sqrt{6}}$ [c] $\dfrac{6}{\sqrt{7}+3}$

[8] Divide. Rationalize the denominator and simplify, if possible.

[a] $\dfrac{\sqrt{72}}{\sqrt{9}}$ [b] $\dfrac{\sqrt{5}}{\sqrt{60}}$

[9] Divide. Write your answer using fractional exponents.

[a] $\dfrac{s^2}{\sqrt[4]{s}}$ [b] $\dfrac{\sqrt[3]{v}}{\sqrt[5]{v}}$

[10] Solve. Check your answers for full credit.

[a] $\sqrt[3]{j}=3$ [b] $\sqrt[5]{6u-9}=\sqrt[5]{5-u}$ [c] $\sqrt{4f-7}=11$ [d] $4+3\sqrt{w}=13$

[e] $17-2\sqrt{1-3z}=9$ [f] $q+\sqrt{q+11}=1$ [g] $8-5\sqrt{v}=33$

[11] Simplify. Write your answers using radicals.

[a] $\sqrt{72h^7}$ [b] $\sqrt{20c^8t^{11}y^6}$ [c] $\sqrt{20a^7}\sqrt{15a^8}$

[d] $(5-\sqrt{3y})(5+\sqrt{3y})$ [e] $\dfrac{\sqrt{3}}{\sqrt{64d^6j}}$

[12] Find the distance between the points $(-2, 7)$ and $(-5, -2)$.

[13] Find the equation of the circle with center $(-2, 5)$ and radius $9$.

[14] Find the centers and radii of the following circles.

[a] $(x-7)^2+(y+4)^2=25$ [b] $x^2+y^2+4x+10y+12=0$

[15] Solve $3+|2x+1|=10$

[16] Solve $|3x-2|<8$

[17] Solve $|5-4x|>11$

[18] Translate into absolute value equations or inequalities.

[a] $x$ is no more than $8$ away from $5$
[b] $x$ and $-2$ are $5$ units apart
[c] $x$ is a minimum of $12$ away from $1$

**ANSWERS**

[1] [a] $-7$ [b] $\frac{3}{5}$ [c] $-1$

[2] [a] $4-a-a^2$ [b] $2a^2+17a+34$

[3] [a] yes [b] no [c] yes

[4] [a] no [b] no [c] yes [d] no [e] yes
[f] no

[5] [a] $j^{\frac{8}{5}}$ [b] $e^{\frac{11}{4}}$ [c] $w^{\frac{5}{2}}$ [d] $f^{\frac{9}{2}}$ [e] $z^{\frac{1}{7}}$
[f] $u^{-\frac{5}{2}}$

[6] [a] $7\sqrt{2}$ [b] $6\sqrt{3}$ [c] $q^7$ [d] $h^4$ [e] $c^{\frac{4}{5}}$
[f] $t^{\frac{11}{15}}$ [g] $a^{\frac{7}{15}}$ [h] $7y^{-3}$ [i] $m^{\frac{20}{3}}$ [j] $r^{\frac{7}{4}}$
[k] $13\sqrt{7}$ [l] $-5\sqrt{6}$ [m] $2\sqrt{3}$ [n] $-\sqrt{2}x^{\frac{7}{2}}$ [o] $12-3\sqrt{2}$
[p] $6\sqrt{15}$ [q] $24-6\sqrt{2}-2\sqrt{3}+4\sqrt{6}$

[7] [a] $\frac{\sqrt{5}}{15}$ [b] $\frac{2\sqrt{6}}{21}$ [c] $9-3\sqrt{7}$

[8] [a] $2\sqrt{2}$ [b] $\frac{\sqrt{3}}{6}$

[9] [a] $s^{\frac{7}{4}}$ [b] $v^{\frac{2}{15}}$

[10] [a] $j=27$ [b] $u=2$ [c] $f=32$ [d] $w=9$ [e] $z=-5$
[f] $q=-2$ [g] no solution

[11] [a] $6h^3\sqrt{2h}$ [b] $2c^4t^5y^3\sqrt{5t}$ [c] $10a^7\sqrt{3a}$ [d] $25-3y$ [e] $\frac{\sqrt{3j}}{8d^3j}$

[12] $3\sqrt{10}$

[13] $(x+2)^2+(y-5)^2=81$

[14] [a] center = $(7,-4)$, radius = $5$
[b] center = $(-2,-5)$, radius = $\sqrt{17}$

[15] $x=3$ or $x=-4$

[16] $-2<x<\frac{10}{3}$

[17] $x<-\frac{3}{2}$ or $x>4$

[18] [a] $|x-5|\le 8$ [b] $|x+2|=5$ [c] $|x-1|\ge 12$