Standard 3 Review:

Name: ______________________________

1. Rewrite the following Radicals with Rational Exponents.

   a. $\sqrt[4]{x}$

   b. $\sqrt[3]{(3x-2)^5}$

2. Rewrite the following in Radical Notation.

   a. $x^{\frac{1}{2}}$

   b. $(4-5x)^{\frac{2}{7}}$

3. Simplify.

   a. $\sqrt{324}$

   b. $\sqrt[3]{-64}$

   c. $\sqrt{8}$

   d. $(-32)^{\frac{1}{5}}$

   e. $27^{\frac{4}{3}}$

   f. $-125^{-\frac{2}{3}} = -5^{-2} = -25^{-1}$
   $= -\frac{1}{25}$

4. Simplify.

   a. $3\sqrt{7} - 2\sqrt{7}$

   b. $\sqrt[3]{2} - \sqrt[4]{3}$ already simplified

   c. $\sqrt{3} \bullet \sqrt{27}$

   d. $\frac{\sqrt{18}}{\sqrt{2}}$

   e. $3\sqrt{50} + 5\sqrt{32}$

   f. $\sqrt{\frac{16}{49}}$

5. Rationalize the denominators.

   a. $\frac{2}{\sqrt{6}}$

   b. $\frac{4}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$

   c. $\frac{8}{(4+\sqrt{2})} \cdot \frac{4-\sqrt{2}}{(4-\sqrt{2})} = \frac{\overset{4}{\cancel{8}}(4-\sqrt{2})}{\underset{7}{\cancel{14}}}$
   $4^2 - \sqrt{2}^2 \quad 16-2$
   $= \frac{4(4-\sqrt{2})}{7}$

   d. $\frac{11}{6-\sqrt{3}}$

   e. $\frac{6}{3-2\sqrt{2}}$

   f. $\frac{2}{4^{\frac{1}{3}}} \cdot \frac{4^{\frac{2}{3}}}{4^{\frac{2}{3}}} = \frac{2 \cdot 4^{\frac{2}{3}}}{4^{\frac{1}{3}+\frac{2}{3}}} = \frac{\cancel{2} \cdot 4^{\frac{2}{3}}}{\cancel{4}^1 2}$
   $= \frac{4^{\frac{2}{3}}}{2}$

$4^2 \cdot 4^3 = 4^5$

$4 \cdot 4 \times 4 \cdot 4 \cdot 4$

6. Solve the Radical Equations. Check for Extraneous Solutions.

a. $\sqrt{x+10}-3=2$

b. $\sqrt{4x+1}+5=14$

c. $\sqrt[3]{3x-3}+4=7$

$-4 \quad -4$

$\left(\sqrt[3]{3x-3}\right)^3 = 3^3$

$3x-3=27$

$3x=30$

$x=10$ ✓

d. $\sqrt[4]{2x+6}-1=1$

e. $5x^{\frac{4}{3}}-11=394$

$+11 \quad +11$

$\frac{\cancel{5}x^{4/3}}{\cancel{5}}=\frac{405}{5}$

$\left[x^{4/3}\right]^{3/4}=\left[81\right]^{3/4}$ ✓

$x=27$

f. $\left[(x^2+4x-13)^{\frac{2}{3}}\right]^{3/2}=\left[4\right]^{3/2}$

c. $\sqrt{x}+\sqrt{x-5}=1-\sqrt{x}$

$-\sqrt{x}$

$\left(\sqrt{x-5}\right)^2=\left(1-\sqrt{x}\right)^2$

$x-5=(1-\sqrt{x})(1-\sqrt{x})$

$\cancel{x}-5=1-2\sqrt{x}+\cancel{x}$

$-x \quad -x$

$-5=1-2\sqrt{x}$

$\frac{-6}{-2}=\frac{-2\sqrt{x}}{-2}$ $\longrightarrow$ $3^2=\left(\sqrt{x}\right)^2$

$\times$ $9=x$ bogus

d. $\sqrt{2x+6}-\sqrt{x+4}=1+\sqrt{x+4}$

$0-1\neq 1$

$+\sqrt{x+4}$

$\left(\sqrt{2x+6}\right)^2=\left(1+\sqrt{x+4}\right)^2$

$2x+6=1+2\sqrt{x+4}+x+4$

$-x \quad -5 \quad -1 \quad -x-4$

$(x+1)^2=\left(2\sqrt{x+4}\right)^2$

$x^2+2x+1=4(x+4)=4x+16$

$x^2-2x-15=0$

$(x-5)(x+3)$

$x=5, \cancel{-3}$ ✓

7. Find the Radical Domains.

a. $f(x)=\sqrt{2x-6}$

$2x-6\geq 0$

b. $f(x)=\sqrt{15+2x-x^2}$

$x^2-2x-15$

$(x-5)(x+3)$

$5, -3$

$-3 \quad 5$

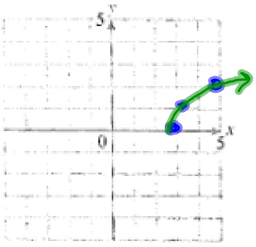
D: $[-3,5]$

$\sqrt{x}$

8. Graph the Radicals by plotting points. Include at least 3 points.

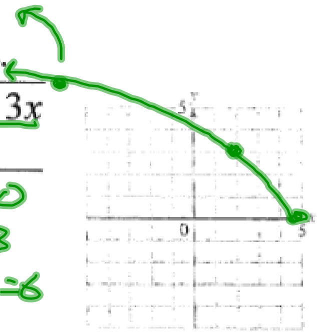
a. $y=\sqrt{2x-6}$

x	y
5	$\sqrt{4}=2$
3.5	$\sqrt{1}=1$
3	$\sqrt{0}=0$
7.5	$\sqrt{9}=3$



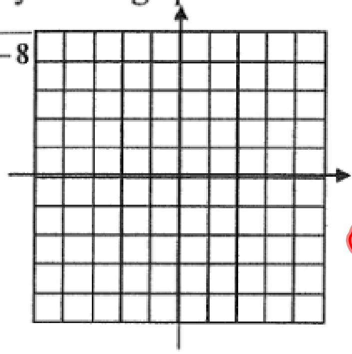
b. $y=\sqrt{15-3x}$

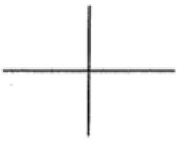
x	y
5	$\sqrt{0}=0$
2	$\sqrt{9}=3$
-7	$\sqrt{36}=6$



9. Find the Domains and sketch the graphs of the following Radical Equations. Visibly visualize the polynomial graphs!

a. $f(x)=\sqrt{x^2-2x-8}$





no domain restrictions

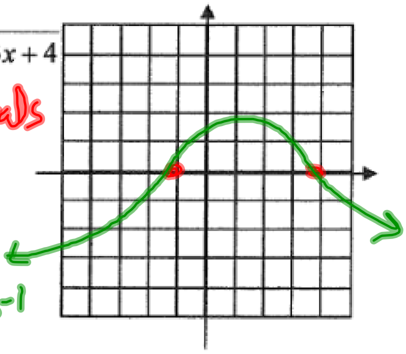
b. $f(x)=\sqrt[3]{-x^2+3x+4}$

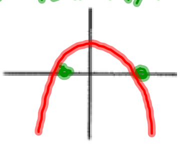
Domain: all reals

$-x^2+3x+4$ $\cap$

x^2-3x-4

$(x-4)(x+1)$ $x=4,-1$



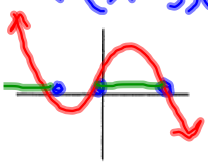


c. $f(x)=\sqrt{-x^3+x^2+6x}$

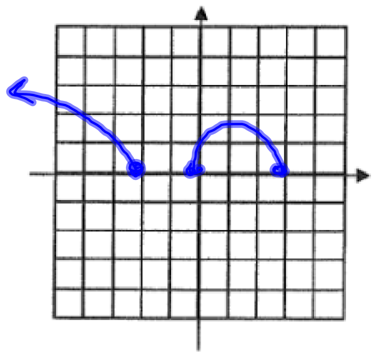
$-x^3+x^2+6x$

$-x(x^2-x-6)$

$-x(x-3)(x+2)$ $x=-2,0,3$



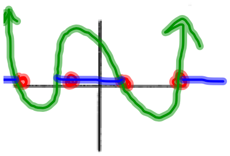
Domain: $(-\infty,-2]$ and $[0,3]$



d. $f(x)=\sqrt{x^4-29x^2+100}$

$(x^2-4)(x^2-25)$

$(x+2)(x-2)(x+5)(x-5)$



D: $(-\infty,-5],[-2,2],[5,\infty)$