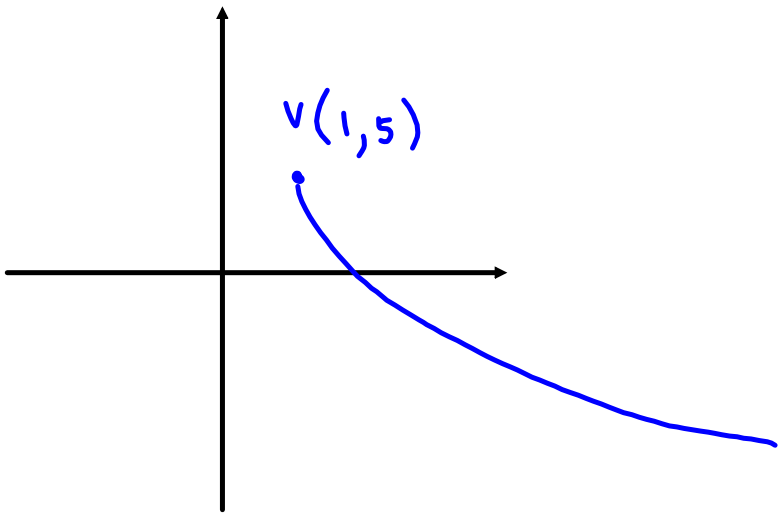
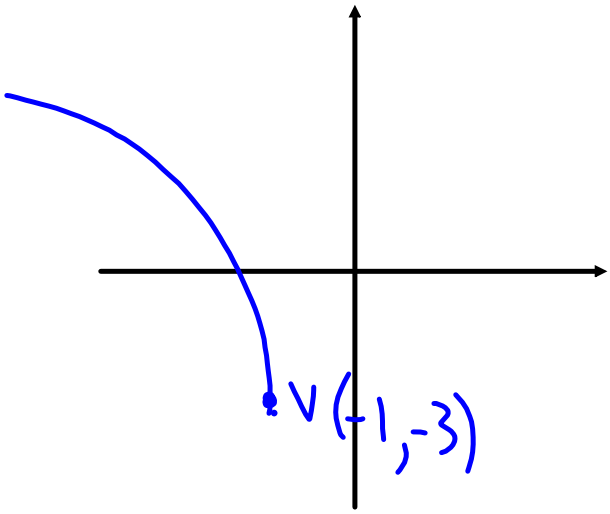
$f(x) = -3\sqrt{2(x-1)} + 5$



$$g(x) = \frac{1}{2}\sqrt{-4(x+1)} - 3$$



Radicals and Rationalizing

Goal:

- to simplify radicals and rationalize denominators

When working with square root functions, we may be required to simplify expressions containing radicals. This may be adding, subtracting, multiplying, dividing and rationalizing expressions.

Ex: Simplify.

a) $\sqrt{40}$

$= \sqrt{4 \cdot 10}$

$= \sqrt{4} \cdot \sqrt{10} \quad = 2\sqrt{10}$

b) $\sqrt{7} \times \sqrt{4}$

$= \sqrt{7} \cdot 2$

$= 2\sqrt{7}$

$\sqrt{10} \cdot \sqrt{6}$

$= \sqrt{60}$

$= 2\sqrt{15}$

c) $8^{\frac{1}{2}} \div 2^{\frac{1}{2}}$

$= \dfrac{\sqrt{8}}{\sqrt{2}}$ or $= \dfrac{2\sqrt{2}}{\sqrt{2}}$

$= \sqrt{\dfrac{8}{2}}$

$= \sqrt{4} = 2$

d) $9\sqrt{5} - 4\sqrt{5}$

$= 5\sqrt{5} \quad = \sqrt{125}$

e) $2\sqrt{6}\left(3\sqrt{2} + 4\sqrt{6}\right)$

$= 6\sqrt{12} + 8\sqrt{36}$

$= 6\sqrt{4}\sqrt{3} + 8(6)$

$= 12\sqrt{3} + 48$

A convention in math (agreed upon system) is that radicals should not be in the denominator of a rational expression (fraction). Removing a radical from the denominator is to rationalize the denominator.

Ex: Rationalize the denominators.

a) $\frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{2\sqrt{3}}{3}$

b) $\frac{3}{\sqrt{2}+1} \cdot \frac{\sqrt{2}-1}{\sqrt{2}-1}$

$= \frac{3\sqrt{2}-3}{2-1}$

$= 3\sqrt{2}-3$

c) $\frac{3\sqrt{x}+\sqrt{y}}{\sqrt{x}-\sqrt{y}} \cdot \frac{\sqrt{x}+\sqrt{y}}{\sqrt{x}+\sqrt{y}}$

$= \frac{3x + 3\sqrt{x}\sqrt{y} + \sqrt{x}\sqrt{y} + y}{x - y}$

$= \frac{3x + 4\sqrt{xy} + y}{x - y}$

$\frac{3x}{x}$

p. 39 # 1-3 (selection)

p. 40 # 6, 7