For more information and practice, see the blog and the Piazza discussion board!

Note: I have not put in all the steps in the work below. You should try to do the problems filling in the missing steps. The WeBWorK problems I refer to will show more detail. On the Test you must show ALL work, because you are being graded on your work!

Self-Test 1:

1) $|x-5|=3$
$x-5=3$ or $x-5=-3$
Answer: $x=8$ or $v=2$
For more explanation and practice, see the WeBWorK Absolute Value Inequalities problems 3 and 4

2) Solve the inequality using the "test-point" method. Give your answers in three forms: draw the graph on the real line, then give the solutions in interval form and in inequality form.
$|x-5|\leq 2$
Outline of solution method: I don't know how to put the graphs in here so they are described. (But you should draw them.)
First solve the related equation $|x-5|=2$ using the method of problem 1. You get two solutions to this equation: $x=-3$ or $x=7$
Those two numbers cut the real line into three subintervals: $(-\infty,-3)$, $-3,7)$, and $(7,infty)$.
Choose a number INSIDE each of those intervals and test it in the original inequality.
Then decide whether the endpoints -3 and 7 are included or not.

For this problem the graph of the solution set has a solid dot on both the -3 and the 7, and the interval in between them is shaded.. The solution set is $[-3,7]$ in interval form.
In inequality form the solution set is $-3\leq x\leq 7)$

You must carry out ALL of the above steps completely. Do not use any other method nor try to shortcut this. For more explanation and practice, see the WeBWorK Absolute Value Inequalities problems 5, 6, and 7

3) Find the domain of each of the following functions

a) $f(x)=x^2-3x$: this is a polynomial function, so the domain is the set of all real numbers.

b) $f(x)=\sqrt{x-3}$: We need the radicand $x-3$ to be greater than or equal to 0: solving $x-3\geq 0$ gives the domain $x\geq 3$, or in interval form, $[3,\infty)$

c) $f(x)=\frac{x-2}{x+5}$: We need the denominator not to be 0, so $x+5\neq 0$ which gives the domain $x\neq -5$. In interval form this is $(-\infty,-5)\cup(-5,infty)$

See the WeBWorK assignment Functions - Notation problems 2 and 4

4) Find the equation of the line which passes through the points $(-1,4)$ and $(2,-2)$ and put it in slope-intercept form: reduce fractions to lowest terms (do not use decimals).

The slope of this line is $\frac{4-(-2)}{-1-2}$ which simplifies to $\frac{6}{-3}=-2$
Substitute this slope and either one of the points into either the point-slope form or the slope-intercept form, and solve to get the equation

$$y=-2x$$

(the y-intercept is 0).

5) Compute and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = 3x - 2x^2$

First find $f(x+h) = 3(x+h) - 2(x+h)^2 = 3x + 3h - 2x^2 - 4xh - 2h^2$
Then find $f(x+h) - f(x) = 3x + 3h - 2x^2 - 4xh - 2h^2 - (3x - 2x^2) = 3h - 4xh - 2h^2$
Then divide by h to find $\frac{f(x+h)-f(x)}{h} = \frac{3h-4xh-2h^2}{h} = \frac{h(3-4x-2h)}{h} = 3 - 4x - 2h$

See the WeBWorK Functions - Difference Quotient

Self-Test 2:

1) $|4x-5|=12$
$4x-5=-12$ or $4x-5=12$
Solve these two equations to get the solutions
$x=-\frac{7}{[}4$ or $x=\frac{17}{4}$

2) Solve the inequality using the "test-point" method. Give your answers in three forms: draw the graph on the real line, then give the solutions in interval form and in inequality form.
$|x+2|>2$
(do this by the same method as in Self-Test 1)
The graph has an open circle on each of the numbers -4 and 0. The intervals on the left end and the right end are shaded.
In interval form, $(-\infty,-4)\cup(0,infty)$
In inequality form, $x<-4$ or $x>0$). (The word "or"" is part of the answer.)

You must carry out ALL of the above steps completely. Do not use any other method nor try to shortcut this. For more explanation and practice, see the WeBWorK Absolute Value Inequalities problems 5, 6, and 7

3) A function $A(x)$ is defined as follows:

$$A(x)=\begin{cases} x-3 & \text{if } x\le 5 \\ 2x+1 & \text{if } x>5 \end{cases}$$

Find each of the following values:
$A(0)=0-3=-3$ because $x=0$ is ≤ 5
$A(5)=5-3=2$ because $x=5$ is ≤ 5
$A(10)=2(10)+1=21$ because $x=10$ is greater than 5
The domain of A(x) is $(-infty,5]\cup(5,\infty)=(-infty,\infty)$ (The set of all real numbers.)

See this website: https://www.mathsisfun.com/sets/functions-piecewise.html
item[4)] For the function $f(x)=\sqrt{x-5}$, find the value of each of the following. Simplify your answers as much as possible but do not use decimals.

a) $f(9)=\sqrt{9-5}=2$

b) $f(5)=\sqrt{5-5}=0$

c) $f(0) isnotarealnumber$

d) $f(a+h)=\sqrt{a+h-5}$

e) $f(a)=\sqrt{a-5}$

f) $f(a+h)-f(a)=\sqrt{a+h-5}-\sqrt{a-5}$

g) $\frac{f(a+h)-f(a)}{h}=\frac{\sqrt{a+h-5}-\sqrt{a-5}}{h}=\frac{1}{\sqrt{a+h-5}+\sqrt{a-5}}$
See the WeBWorK RadicalFunctionsDifferenceQuotient for the detaILS.

5) Give the formula for the function g(x) whose graph is the same as the graph of $f(x)=\sqrt{x}$ but shifted to the left by 3 units and down by 2 units.
$g(x)=\sqrt{x+3}-2$
See the WeBWorK Functions - Translations.