1. **(4 points)** *Solve the equation* $3|x+5| = 6$ *(note the absolute value bars).*

   Dividing both sides by 3 gives $|x+5| = 2$. There are two ways that an absolute value can equal 2; the expression of which the absolute value is being taken can be either 2 or −2, so we have two possibilities:

$$x + 5 = 2 \quad \text{or} \quad x + 5 = -2$$
$$x = -3 \quad \text{or} \quad x = -7$$

2. **(4 points)** *Write the equation in slope-intercept form of a line passing through the points* $(4, -2)$ *and* $(6, 4)$.

   We start by finding the slope of the line, by dividing the difference between the two y-coordinates (the "rise") by the difference between the two x-coordinates (the "run"):

$$m = \frac{4 - (-2)}{6 - 4} = \frac{6}{2} = 3$$

   so we seek oa line of slope 3 through these points. We pick either of the points (we'll get the same answer no matter which) in instert them into point-slope form. So, for instance, if we choose $(6, 4)$, we would put $m = 3$, $x_0 = 6$, and $y_0 = 4$ into the point-slope form

$$y - y_0 = m(x - x_0)$$

   and perform some minor algebraic adjustments to get the slope-intercept form $y = mx + b$:

$$\begin{aligned} y - 4 &= 3(x - 6) \\ y - 4 &= 3x - 18 \\ y &= 3x - 14 \end{aligned}$$

   Alternatively, one could use 2-point form, if one wished. The two-point form gives the equation:

$$\frac{y-4}{x-6} = \frac{(-2) - 4}{4 - 6}$$

   which can be reduced to slope-intercept as follows:

$$\begin{aligned} \frac{y-4}{x-6} &= \frac{-6}{-2} \\ \frac{y-4}{x-6} &= 3 \\ y - 4 &= 3(x - 6) \\ y - 4 &= 3x - 18 \\ y &= 3x - 14 \end{aligned}$$

3. **(4 points)** *If* $f(x) = x^2 - 3x$, *simplify the following expressions:*

   - **(1 point)** $f(2)$.
     We substitute 2 in for every occurrence of x, and will find that $f(2) = 2^2 - 3 \cdot 2 = 4 - 6 = -2$.

- **(1 point)** $f(-3)$.
  We substitute -3 in for every occurrence of x, and will find that $f(-3) = (-3)^2 - 3(-3) = 9 + 9 = 18$.
- **(2 points)** $f(x+1)$.
  We substitute $x+1$ in for every occurrence of x, and will find that $f(x+1) = (x+1)^2 - 3(x+1) = x^2 + 2x + 1 - 3x - 3 = x^2 - x - 2$.

4. **(3 points)** *A piecewise function is given by the formula* $g(x) = \begin{cases} \sqrt{x-1} & \textit{if } x \geq 1 \\ 2 - 2x & \textit{if } x < 1 \end{cases}$. *Evaluate the following expressions:*

- $f(2)$.
  Since $2 \geq 1$, we'll evaluate $g(x)$ as if it were $\sqrt{x-1}$; so using 2 in place of x, we get $\sqrt{2-1} = \sqrt{1} = 1$.
- $f(1)$.
  Since $1 \geq 1$, we'll evaluate $g(x)$ as if it were $\sqrt{x-1}$; so using 1 in place of x, we get $\sqrt{1-1} = \sqrt{0} = 0$.
- $f(0)$.
  Since $0 < 1$, we'll evaluate $g(x)$ as if it were $2 - 2x$; so using 0 in place of x, we get $2 - 2 \cdot 0 = 2$.