MATH 1210 FALL 2017, HOMEWORK 1

The graded problems were 0.3.40abc, 0.5.14, and 0.7.14.

0.3.40  
(a) $(3, 1)$ is on the line $3x + cy = 5$ precisely when $3(3) + c(1) = 5$, i.e. $c = -4$.
(b) A line is parallel to the $y$-axis when its equation has the form $x = a$ for some real number $a$. So $c = 0$.
(c) Two lines are parallel if and only if they have the same slope. The slope of $2x + y = -1$ is $-2$, while the slope of $3x + cy = 5$ is (provided $c \neq 0$) $-3/c$. Setting $-2 = -3/c$, we find $c = 3/2$.
(d) The $x$ and $y$ intercepts of $3x + cy = 5$ are, respectively, $5/3$ and $5/c$, so these are equal precisely when $c = 3$. (Alternatively, a line with equal $x$ and $y$ intercepts must have slope $-1$, so we can appeal to the slope formula of part (c).)
(e) Two lines are perpendicular precisely when their slopes $m_1$ and $m_2$ satisfy $m_1 = -1/m_2$ (unless they are horizontal and vertical, in which case this equality does not make literal sense). The slopes of the two lines in this problem are (as before) $-3/c$ and 3, so we are asked to solve $3 = c/3$, i.e. $c = 9$.

0.5.14  
(a) All reals where the denominator does not vanish, i.e. all real $x \neq -2, 3$.
(b) All reals $y > -1$ (for $y = -1$ the expression leads to division by zero, and for $y < -1$ it leads to taking the square root of a negative number).
(c) All real numbers.
(d) All real numbers.

0.7.14  
Quiz (a) Using point-slope form, $y - 2 = \sqrt{3}(x - 1)$. (Other forms of the line are fine too.)
(b) 

(c) 3 times, once in each of the intervals \((0, \pi), (\pi, 2\pi), (2\pi, 3\pi)\).