Name:——————————————————————————

NetID:————————————   **Lecture:**   **A**

Discussion: **Monday & Wednesday   1:30   2:30**

(15 points) Recall that a real number p is rational if there are integers m and n (n non-zero) such that $p = \frac{m}{n}$. Use this definition and your best mathematical style to prove the following claim:

For all real numbers x and y, $x \neq 0$, if x and $\frac{y+1}{2}$ are rational, then $\frac{5}{x} + y$ is rational.

Name:_____

NetID:_____   **Lecture:**   **A**

Discussion: **Monday & Wednesday   1:30   2:30**

1. (5 points) Is the following claim true? Informally explain why it is, or give a concrete counter-example showing that it is not.

   For any positive integers s, t, p, q, if $s \equiv t \pmod{p}$ and $p \mid q$, then $s \equiv t \pmod{q}$.

2. (6 points) Use the Euclidean algorithm to compute $\gcd(2262, 546)$. Show your work.

3. (4 points) Check the (single) box that best characterizes each item.

   $\gcd(p, q) = \dfrac{pq}{\mathrm{lcm}(p, q)}$
   (p and q positive integers)   always ☐   sometimes ☐   never ☐

   $7 \mid -7$
                                   true ☐   false ☐