Question 1

False.

Proof by contradiction:

N is the set of Natural numbers 1, 2, 3, ……(not including 0 in this course)

Assume $(\exists m \in N)(\exists n \in N)(3m + 5n = 12)$ is true.

So 3m + 5n = 12

dividing by 3 gives: m + $\frac{5}{3}$n = 4.

But m and n are natural numbers since $\frac{5}{3}n \geq 1$ so m must be either 1, 2 or 3.

If m = 1 then $\frac{5}{3}n = 3$, so 5n = 9. But 5|9 is false because no integer q exists such that 9 = 5q.

If m = 2 then $\frac{5}{3}n = 2$, so 5n = 6. But 5|6 is false because no integer q exists such that 6 = 5q.

If m = 3 then $\frac{5}{3}n = 1$, so 5n = 3. But 5|3 is false because no integer q exists such that 3 = 5q.

Therefore there is no circumstance for $(\exists m \in N)(\exists n \in N)(3m + 5n = 12)$ to be true.

Therefore $(\exists m \in N)(\exists n \in N)(3m + 5n = 12)$ must be false.