1. Base test:

So, P(1) is true.

Induction test:

So, by inductive hypothesis,

1. Base test:

So, P(1) is true.

Induction Test:

So, by inductive hypothesis,

1. Base test:

­Therefore, P(0) is true.

Inductive Test:

So, by inductive hypothesis,

1. Base Test:

Therefore P(1) is true.

Inductive test: Assume

So, by assumption,

Therefore, if . Then will always be true also.

1. Base Test: which is true as

Induction Test:

Therefore, if P(k) is divisible by 6, P(k+1) is also divisible by 6 because is also divisible by 6.

* 1. Regular Induction

Base test:

Induction test: Assume we have a postage for k cents

Come up with a postage for k+1 cents.

Case 1: k contains a 7-cent stamp

We add two 4-cent stamps and remove the 7-cent stamp.

Case 2: k contains no 7-cent stamps (only 4-cent stamps)

If k has no 7-cent stamp, then k is multiple of 4. Since , then k must be at least 20 because lowest multiple of 4 is 20 in this case. Therefore, at least five 4-cent stamps are used. If we add another 4-cent and remove three 7-cent stamps, we will get k

* 1. Strong Induction

Basis steps:

P(18): 18 cents can be made of two 7-cent stamps and one 4-cent stamp as 2(7)+4 = 18.

P(19): 19 cents can be made from three 4-cent stamps and one 7-cent stamp as 3(4) + 7 = 19.

P(20): 20 cents can be made from five 4-cent stamps as 5(4) = 20.

We assume for

Prove

If = true, then is also true. Therefore, is true.

1. Base Test:

Therefore, P(1) is true.

Inductive Test: Assume is true. We want to prove that

is true.

Case 1: is even.

So, by inductive hypothesis, k+1 is divisible by 2

where x1, x2, …, xz are distinct.

If x1, x2, …, xz are distinct power of 2, then x1 + 1, x2 + 1, … , xz + 1 are also distinct power of 2

Case 2: is odd

So, by inductive hypothesis,

where x1, x2, …, xz are distinct.

If we add both side by 1, which 1 is also equals to

0, x1, x2, …, xz are still distinct power of 2.