Q1

P(n) = q is irrational

Q(n) = sq rt(q) is irrational

P(n)->Q(n) = Q(n)’->P(n)’

If sq rt q is rational, q is rational

Let sq rt q be m/n.

q = (m^2/n^2)

Thus, this proves the statement

Q2 wrong

P(m) = {sum of first n odd positive integers=n^2}

P(1) = 1 = 1^2 True

P(m) = 1+3+5+…+2m-3 + 2m-1

2P(m) = 2m + 2m 2m +… , with m terms

2P(m) = 2m^2

P(m) = m^2

P(k+1) = P(k)+ 2k+1 = k^2+2k+1

2P(m+1) = 1+…2m+1 = (2m+2)(m+1) = 2m^2+2m+2m+2 = 2m^2+4m+2

P(m+1) = m^2+2m+1

So P(n) is true for n=k+1 and thus true for all n: ꓯnP(n) is true

Q3wrong

P(n) = [n^3-n]/3

P(1) = [1^3-1]/3 = 0

P(n+1) = [(n+1)^3-(n+1)]/3

=[n^3+3n^2+3n+1-n-1]/3

=[n^3+3n^2+2n]/3

=[n^3-n + 3n^2 +3n]/3

=[n^3-n]/3 + n^2+n

Since [n^3-n] divisible by three, P(n+1) is divisible by 3

Thus, P(n) is true for n = k+1 and true for all n: ꓯnP(n)

n^3+3n^2+2n

=n(n^2+3n+2)

=n(n+1)(n+2)

Smallest integer of n is 1

Thus n=1, n+1 =2,n+2 = 3

Therefore n^3+3n^2+2n is divisible by 2 and 3 and is divisible by 6.

So, P(n) is true for n=k+1 and true for all n: ꓯnP(n)

Q4

1^2+2^2+…+N^2=1/6 x n x n+1 x 2n+1

P(1) = 1^2=1/6 x 1x 2 x3 =1 True

P(n) = 1^2+2^2+…+N^2

P(k+1) = P(k) + (k+1)^2

1^2+2^2+…+k^2+(k+1)^2

= 1^2+2^2+…+N^2+(k^2+2k+1)

=1/6 x k x k+1 x 2k+1 + k^2+2k+1

=1/6 [(k^2+k)(2k+1) ]+k^2+2k+1

=1/6 [(2k^3+3k^2+k) ]+k^2+2k+1

Sub k+1 as n in other side of eqn

P(k+1) = 1/6 x k+1 x k+2 x 2k+2 +1

=1/6 (k+1)(k+2)(2k+3)

=1/6 (k^2+2k+k+2)(2k+3)

=1/6 (k^2+3k+2)(2k+3)

=1/6(2k^3+3k^2+6k^2+9k+4k+6)

=1/6[(2k^3+3k^2+k) +(6k^2+12k+6)]

=1/6 [(2k^3+3k^2+k)]+k^2+2k+1

Thus P(k+1) = P(k) + (k+1)^2

So, P(n) is true for n=k+1 and true for all n: ꓯnP(n)

Q5

ꓯn>= 1, ꓯx>= -1

P(1) = (1+x)^1 =1+(1)x =1+x

P(n) =(1+x)^n >= 1+nx

P(k+1) = (1+x)^k \*(1+x) >= 1+ (k+1)x

=(1 + x)^k \* (1+x) >= 1+kx + x

Since 1+x >x and (1+x)^k>= 1+kx, P(k+1) is true and hence P(n) is true for all n>=1,x>= -1

Q6wrong

2^n > n^2+6, n>=5

P(n) =2^n > n^2+6 assumed True

P(5) =2^5 > 5^2 +6 = 32>31

P(k+1) = 2^(k+1) >= (k+1)^2 +6

2 x 2^k >= k^2 +2k +1 +6

2^k + 2^k >= k^2+6 +2k+1

Since 2^k >= k^2+6 is true,

2^k>=2k+1

Since k>=1, 2^k will always be >=2k+1

So, P(n) is true for n=k+1 and true for all n>=5