Part A Q1

```
function [x,y] = partAQ1(x0,y0,v0,theta,t)
g = 9.81;
x = x0 + (v0*cosd(theta))* t;  % x position formula
y = y0 + (v0*sind(theta)) * t - (0.5 *g*t.^2);  % y position formula
end
```

Part A Q2

```
function partAQ2(x0,y0,v0,theta,t)
g = 9.81;
x = x0 + v0 * cosd(theta) * t;              % x position formula
y = y0 + v0 * sind(theta) * t - (g*t.^2)/2  % y position formula
plot(x,y)                                   % plots (x,y) positions
title('Position of Arrow in x,y plane')
xlabel('Horizontal Position')
ylabel('Vertical Position')
end
```

Part A Q3

```
function Range = partAQ3(y0,v0,theta)
g = 9.81;
Range = ((v0^2)/(2*g)) * (1 + (sqrt(1 + ((2*g*y0)/(v0^2 * (sind(theta)^2)))))) *
sind(2*theta) % Formula is derived from the projectile motion equations to
calculate the range = x when y is zero.
end
```

Part A Q4

```
function [Speed,Angle] = partAQ4(v0,theta,t)
g = 9.81;
x_velocity = v0 * cosd(theta) % Finds the velocity in the x direction.
y_velocity = v0 * sind(theta)-g*t % Finds the velocity in the y direction.


% Find's Speed.
Speed = sqrt(x_velocity.^2 + y_velocity.^2);


% Find's Angle in degrees.
Angle = atand(y_velocity / x_velocity)


end
```

Part B Q1

```
function Validity = partBQ1(N)
if N > floor(N)   % Statement checks to see if decimal number. Returning 0.
    Validity = 0;
elseif N < 5      % Statement checks to see if less than 5. Returning 0.
    Validity = 0;
elseif N >= 5     % Statement checks to see if greater or equal to 5. Returning 1.
    Validity = 1;
end
```

Part B Q2

```
function Cost = partBQ2(N)
if N < 5;  % Checks to see if less than 5 motors.
    Cost = 0
elseif N >= 5 & N <= 10; % Calculation for 5 - 10 motors.
        N <= 10;
        Cost = 10 * N;
            if Cost < 500; % Shipping cost calculation.
            Cost = Cost + 20
            end
elseif N > 10 & N <= 100; % Calculation for 10 - 100 motors.
        Cost = 100 + (8 * (N - 10));
            if Cost < 500; % Shipping cost calculation.
                Cost = (100 + (8 * (N - 10))) + 20
            end
elseif N > 100; % Calculation for more than 100 motors.
    Cost = 820 + ((N - 100) * 6);
end
end
```

Part B Q3

```
function Nmax = partBQ3(Budget)
if Budget < 70
    Nmax = 0
elseif Budget >= 70 & Budget <= 120 % Budget range for 5 - 10 motors inc shipping.
    Nmax = floor((Budget - 20)/10)
elseif Budget > 120 & Budget < 500 % Budget range for 10 - $500 worth of motors
inc shipping.
    Nmax = 10 + floor((Budget - 120)/8)
elseif Budget >= 500 & Budget < 820 % Budget range for $500 worth of motors to 100
motors no shipping.
    Nmax = 10 + floor((Budget - 100)/8)
elseif Budget >= 820  % Budget for more than 100 motors.
    Nmax = floor(100 + (Budget - 820)/6)
end
end
```