Simulation

Total Profit Function:

$$\mathbf{P_T = nP_V}$$

Where:

$\mathbf{P_T}$ is the total profit
$\mathbf{n}$ is the number of vehicles sold
$\mathbf{P_V}$ is the profit per vehicle

PART A

Computing Bin Increment and Ranges

Given:

n follows a uniform distribution with minimum of 1 and maximum 10

P_v follows a normal distribution with a mean of \$8000 and a standard deviation of \$1000

Number of bins: 5

Using plus/minus 3 standard deviations for P_v:

Minimum bin value = nMin * P_vMin = 1 * 5000 = 5000

Maximum bin value = nMax * P_vMax = 10 * 11000 = 110000

Range of bins = 110000 – 5000 = 105000

Bin increment = 105000 / 5 = 21000

Bin #	Range
1	\$5,000 - \$26,000
2	\$26,001 - \$47,000
3	\$47,001 - \$68,000
4	\$68,001 - \$89,000
5	\$89,001 - \$110,000

PART B

GetRandomUniform

```
    uniform = rand.Next(min, max + 1);
```

GetRandomNormal

```
    // Box-Muller Transformation
    r = rand.NextDouble();
    phi = rand.NextDouble();
    z = (Math.Cos(2 * Math.PI * r)) *
                (Math.Sqrt(-2 * Math.Log(phi)));
    // z is normal with mean = 0 and stddev = 1.
    // We use our values of mean and stddev to
    // scale z, giving us x.
    x = z * stddev + mean;
```

GetBinIndex

```
binIndex = (int) Math.Ceiling((valuetobin -
            mini) *(numbins / (maxi - mini)));
    //valuetobin is Pt to be assigned to a bin
    //mini is Ptmin
    //maxi is Ptmax
    //numbins is number of bins
```