**Producto Académico N° 3**

**Optimizar la función de venta** *f* (*x*) = 10 + *x* \* *x*, bajo las condiciones de los algoritmos evolutivos (genética), en la que x es un número de dos decimales cuyo rango es de 1 a 10 incluyendo estos mismos números, con una precisión de dos decimales. La probabilidad general de cruce es de 0.45 y la de mutación es 0.01

Represente el cromosoma y determine al mejor cromosoma y su valor de venta, al final de la generación 2 a partir de la población inicial de 8 individuos **(15 puntos)**:

|  |
| --- |
| 0000000001 |
| 0010000001 |
| 0010101010 |
| 1111100000 |
| 1010001000 |
| 0001110000 |
| 1000100001 |
| 0000000001 |

Para la generación 0 estos son los valores para la selección mediante el método de la ruleta:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.788 | 0.940 | 0.233 | 0.545 | 0.277 | 0.104 | 0.980 | 0.146 |

Las probabilidades de cruce de cada cromosoma son respectivamente:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.721 | 0.174 | 0.230 | 0.328 | 0.612 | 0.181 | 0.954 | 0.918 |

Y las probabilidades de mutación por cada gen son respectivamente:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.098 | 0.757 | 0.373 | 0.506 | 0.286 | 0.868 | 0.301 | 0.815 | 0.428 | 0.701 |
| 0.997 | 0.906 | 0.332 | 0.520 | 0.885 | 0.762 | 0.805 | 0.299 | 0.560 | 0.260 |
| 0.352 | 0.371 | 0.121 | 0.687 | 0.206 | 0.088 | 0.575 | 0.819 | 0.882 | 0.760 |
| 0.103 | 0.840 | 0.835 | 0.933 | 0.645 | 0.633 | 0.514 | 0.071 | 0.229 | 0.323 |
| 0.917 | 0.886 | 0.001 | 0.762 | 0.305 | 0.846 | 0.039 | 0.0009 | 0.511 | 0.944 |
| 0.350 | 0.745 | 0.082 | 0.590 | 0.482 | 0.0008 | 0.052 | 0.937 | 0.892 | 0.603 |
| 0.611 | 0.897 | 0.565 | 0.487 | 0.594 | 0.202 | 0.118 | 0.100 | 0.891 | 0.712 |
| 0.512 | 0.956 | 0.665 | 0.506 | 0.048 | 0.072 | 0.355 | 0.646 | 0.885 | 0.892 |

Para la generación 1 estos son los valores para la selección mediante el método de la ruleta:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.987 | 0.631 | 0.959 | 0.058 | 0.417 | 0.038 | 0.514 | 0.826 |

Las probabilidades de cruce de cada cromosoma son respectivamente:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.005 | 0.392 | 0.044 | 0.550 | 0.495 | 0.304 | 0.529 | 0.264 |

Y las probabilidades de mutación por cada gen son respectivamente:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.367 | 0.693 | 0.978 | 0.040 | 0.682 | 0.868 | 0.844 | 0.422 | 0.614 | 0.083 |
| 0.058 | 0.904 | 0.941 | 0.807 | 0.707 | 0.656 | 0.735 | 0.872 | 0.183 | 0.986 |
| 0.930 | 0.648 | 0.978 | 0.911 | 0.594 | 0.387 | 0.837 | 0.728 | 0.995 | 0.444 |
| 0.319 | 0.018 | 0.671 | 0.232 | 0.766 | 0.008 | 0.302 | 0.178 | 0.588 | 0.940 |
| 0.906 | 0.160 | 0.030 | 0.851 | 0.862 | 0.647 | 0.347 | 0.543 | 0.987 | 0.979 |
| 0.725 | 0.365 | 0.976 | 0.097 | 0.120 | 0.767 | 0.965 | 0.522 | 0.335 | 0.389 |
| 0.602 | 0.586 | 0.447 | 0.304 | 0.319 | 0.115 | 0.542 | 0.481 | 0.712 | 0.052 |
| 0.843 | 0.348 | 0.738 | 0.805 | 0.147 | 0.157 | 0.778 | 0.471 | 0.238 | 0.996 |

Para la generación 2 estos son los valores para la selección mediante el método de la ruleta:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.981 | 0.170 | 0.712 | 0.451 | 0.272 | 0.342 | 0.679 | 0.325 |

Las probabilidades de cruce de cada cromosoma son respectivamente:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 0.819 | 0.542 | 0.968 | 0.179 | 0.697 | 0.176 | 0.203 | 0.409 |

Y las probabilidades de mutación por cada gen son respectivamente:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.240 | 0.258 | 0.747 | 0.196 | 0.777 | 0.067 | 0.060 | 0.460 | 0.779 | 0.376 |
| 0.740 | 0.748 | 0.854 | 0.391 | 0.402 | 0.510 | 0.831 | 0.946 | 0.712 | 0.994 |
| 0.181 | 0.370 | 0.227 | 0.463 | 0.556 | 0.003 | 0.903 | 0.784 | 0.657 | 0.279 |
| 0.854 | 0.959 | 0.986 | 0.402 | 0.386 | 0.020 | 0.488 | 0.444 | 0.453 | 0.692 |
| 0.446 | 0.928 | 0.965 | 0.922 | 0.589 | 0.273 | 0.279 | 0.936 | 0.248 | 0.322 |
| 0.618 | 0.254 | 0.154 | 0.574 | 0.249 | 0.971 | 0.960 | 0.049 | 0.758 | 0.586 |
| 0.403 | 0.468 | 0.088 | 0.933 | 0.142 | 0.985 | 0.710 | 0.863 | 0.783 | 0.061 |
| 0.0004 | 0.692 | 0.929 | 0.024 | 0.169 | 0.599 | 0.157 | 0.294 | 0.596 | 0.898 |

Modificar el código en C++ y hacer un par de capturas de capturas con dos ejecuciones (5 puntos)