Central Washington University, Department of Computer Science

CS471 Project 1

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1 Benchmark Functions

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$$\begin{aligned}(x+y)^3 &= (x+y)^2(x+y) \\ &= (x^2+2xy+y^2)(x+y) \\ &= (x^3+2x^2y+xy^2)+(x^2y+2xy^2+y^3) \\ &= x^3+3x^2y+3xy^2+y^3\end{aligned} \tag{1.1}$$

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1.1 Heading on level 2 (subsection)

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$$A = \begin{bmatrix} A_{11} & A_{21} \\ A_{21} & A_{22} \end{bmatrix} \tag{1.2}$$

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1.1.1 Heading on level 3 (subsubsection)

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Heading on level 4 (paragraph) Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

2 Lists

2.1 Example of list (3*itemize)

- First item in a list
  - First item in a list
    - First item in a list
    - Second item in a list
  - Second item in a list
- Second item in a list

2.2 Example of list (enumerate)

1. First item in a list
2. Second item in a list
3. Third item in a list

Table 2.1: Computation comparison of DE, GA and PSO

Problem	D_{10}					D_{20}						
	Avg	Median	Range	SD	T(s)	Avg	Median	Range	SD	T(s)	Avg	Me
f_1	-61.8187	-46.7945	3177.65	596.766	$4.33x10^{-6}$	-147.224	1.73384	4926.18	917.825	$1.18x10^{-5}$	-303.707	-26
f_2	859142	838788	$1.75x10^{6}$	237719	$8.96x10^{-7}$	$2.64x10^{6}$	$1.81x10^{6}$	$3.20x10^{6}$	925823	$1.92x10-6$	$5.21x10^{6}$	2.62
f_3	$1.18x10^{13}$	$1.11x10^{13}$	$3.30x10^{13}$	$5.07x10^{12}$	$1.82x10^{-6}$	$3.79x10^{13}$	$2.63x10^{13}$	$6.22x10^{13}$	$1.47x10^{13}$	$4.57x10^{-6}$	$7.79x10^{13}$	4.08
f_4	870095	862871	$1.84x10^{6}$	242235	$3.02x10^{-6}$	$2.62x10^{6}$	$1.77x10^{6}$	$3.85x10^{6}$	942880	$8.67x10^{-6}$	$5.22x10^{6}$	2.60
f_5	219.839	207.346	441.223	69.0671	$3.17x10^{-6}$	661.693	451.624	871.891	238.635	$9.03x10^{-6}$	1315.61	669
f_6	-4.519	-4.501	9.470	0.069	$2.82x10^{-6}$	-14.048	-9.503	19.626	4.519	$8.31x10^{-6}$	-28.591	-14
f_7	260.916	260.034	516.794	30.185	$6.16x10^{-6}$	809.138	554.855	1058.76	265.183	$1.84x10^{-5}$	1658.45	84
f_8	2946.27	2904.35	5900.96	484.65	$4.58x10^{-6}$	9053.53	6136.6	12351	3028.79	$1.352x10-5$	18323.3	921
f_9	194.546	194.821	386.619	2.45452	$6.77x10^{-6}$	604.249	409.676	820.067	194.571	$2.051x10^{-5}$	1230.71	626
f_{10}	3.99	2.82	4.81	0.66	243.33	2.17	1.99	2.35	0.11	20	3.57	3
f_{11}	3.23	2.53	4.03	0.46	435.34	1.19	1.08	1.34	0.08	50	2.47	2
f_{12}	3.23	2.53	4.03	0.46	435.34	1.19	1.08	1.34	0.08	50	2.47	2
f_{13}	3.23	2.53	4.03	0.46	435.34	1.19	1.08	1.34	0.08	50	2.47	2
f_{14}	3.23	2.53	4.03	0.46	435.34	1.19	1.08	1.34	0.08	50	2.47	2
f_{15}	3.23	2.53	4.03	0.46	435.34	1.19	1.08	1.34	0.08	50	2.47	2
Mean	4.03	2.55	5.57	0.97	78.35	2.79	2.54	3.05	0.16	9.15	3.54	3

[1] MacBook Pro, 2.3GHz Intel Core i7 (2nd gen), 8 GB RAM

[2] Pentium P-IV, 3.0 GHz, 512 MB