**K = 2**

Iteration 1:

Enter the value for K and the number of iterations: 2 100

The initialized random numbers for Koala are as shown: 99916 333477

The initialized random numbers for Penguins are as shown: 576798 622281

Compression Ratio for Koala: 44/763 = 0.05766

Compression Ratio for Penguins: 29/760 = 0.03815

Iteration 2:

Enter the value for K and the number of iterations: 2 100

The initialized random numbers for Koala are as shown: 691009 275097

The initialized random numbers for Penguins are as shown: 298636 331321

Compression Ratio for Koala: 44/763 = 0.05766

Compression Ratio for Penguins: 30 / 760 = 0.03947

Iteration 3:

Enter the value for K and the number of iterations: 2 100

The initialized random numbers for Koala are as shown: 712728 144492

The initialized random numbers for Penguins are as shown: 425739 504142

Compression Ration for Koala: 44/763 = 0.05766

Compression Ratio for Penguins: 29/760 = 0.03815

Average Compression Ratio for Koala = 0.05766

Average Compression Ratio for Penguins = 0.03903

**K = 5**

Iteration 1:

Enter the value for K and the number of iterations: 5 100

The initialized random numbers for Koala are as shown: 10145 278466 372168 400469 622059

The initialized random numbers for Penguins are as shown: 402011 344819 379052 252879 669607

Compression Ratio for Koala: 115/763 = 0.1507

Compression Ratio for Penguins: 79/760 = 0.1039

Iteration 2:

Enter the value for K and the number of iterations: 5 100

The initialized random numbers for Koala are as shown: 520356 419397 615489 614054 286497

The initialized random numbers for Penguins are as shown: 260336 719520 472585 578737 117947

Compression Ratio for Koala: 114/763 = 0.1494

Compression Ratio for Penguins: 79/760 = 0.1039

Iteration 3:

Enter the value for K and the number of iterations: 5 100

The initialized random numbers for Koala are as shown: 296522 53850 451660 610755 162234

The initialized random numbers for Penguins are as shown: 586974 151583 714699 448199 315221

Compression Ratio for Koala: 115/763 = 0.1507

Compression Ratio for Penguins: 78/760 = 0.1026

Average Compression Ratio for Koala = 0.1503

Average Compression Ratio for Penguins = 0.1035

**K = 10**

Iteration 1:

Enter the value for K and the number of iterations: 10 100

The initialized random numbers for Koala are as shown: 684201 140352 120628 414227 707959 517144 504815 517150 319832 284974

The initialized random numbers for Penguins are as shown: 147126 333428 459925 358307 254557 485329 81650 453706 117611 759885

Compression Ratio for Koala: 200/763 = 0.2621

Compression Ratio for Penguins: 140/760 = 0.1842

Iteration 2:

Enter the value for K and the number of iterations: 10 100

The initialized random numbers for Koala are as shown: 741152 29333 491794 758272 660957 218802 691619 225350 403648 20507

The initialized random numbers for Penguins are as shown: 267085 742898 650803 759974 363975 129472 218576 768866 218928 219217

Compression Ratio for Koala: 200/763 = 0.2621

Compression Ratio for Penguins: 139/760 = 0.1829

Iteration 3:

Enter the value for K and the number of iterations: 10 100

The initialized random numbers for Koala are as shown: 557288 227470 643447 288188 138637 91265 68283 372081 6382 22039

The initialized random numbers for Penguins are as shown: 425041 771101 46438 90896 224653 53946 421231 116632 86935 754994

Compression Ratio for Koala: 197/763 = 0.2582

Compression Ratio for Penguins: 140/ 760 = 0.1842

Average of compression ratio for Koala: 0.2608

Average of compression ratio for Penguins: 0.1838

**K = 15**

Iteration 1:

Enter the value for K and the number of iterations: 15 100

The initialized random numbers for Koala are as shown: 305369 134060 110722 16009 439543 474554 289280 280059 29159 388106 125081 132835 781164 38662 681371

The initialized random numbers for Penguins are as shown: 84563 17292 152719 491008 587818 203299 395400 563774 759104 472233 617582 176473 509741 111070 245473

Compression Ratio for Koala: 263/763 = 0.3447

Compression Ratio for Penguins: 185/760 = 0.2434

Iteration 2:

Enter the value for K and the number of iterations: 15 100

The initialized random numbers for Koala are as shown: 550902 624572 137861 235280 278270 20733 641827 282749 715747 369057 613413 596305 366585 167087 247877

The initialized random numbers for Penguins are as shown: 194779 252365 651284 262099 760126 449847 494051 400934 655332 673526 568786 141821 166627 166996 652350

Compression Ratio for Koala: 259/763 = 0.3395

Compression Ratio for Penguins: 189/760 = 0.2487

Iteration 3:

Enter the value for K and the number of iterations: 15 100

The initialized random numbers for Koala are as shown: 747524 105657 50395 1846 663516 704576 425417 417034 413613 489431 157127 275112 27798 334216 557607

The initialized random numbers for Penguins are as shown: 422201 397876 141435 464468 284624 560072 740418 413959 607253 329 718799 430808 550231 240871 632133

Compression Ratio for Koala: 252/763 = 0.3303

Compression Ratio for Penguins: 186/760 = 0.2447

Average compression ratio for Koala = 0.3382

Average compression ratio for Penguins = 0.2456

**K = 20**

Iteration 1:

Enter the value for K and the number of iterations: 20 100

The initialized random numbers for Koala are as shown: 728239 199360 331647 741301 71264 757799 589020 728929 209503 639518 762449 18306 725832 389257 153379 500812 667759 185007 60593 763780

The initialized random numbers for Penguins are as shown: 13018 780257 31780 216549 679520 454530 503089 220624 206272 560854 502381 644934 330609 489064 141933 485445 611379 324460 362524 590757

Compression Ratio for Koala: 322/763 = 0.4220

Compression Ratio for Penguins: 231/760 = 0.3039

Iteration 2:

Enter the value for K and the number of iterations: 20 100

The initialized random numbers for Koala are as shown: 664170 509838 585923 202703 527610 425669 20147 424311 227911 631260 630070 690773 48361 381713 338176 71904 580610 462592 586591 227702

The initialized random numbers for Penguins are as shown: 475506 131687 759821 10721 679869 451362 427427 775265 350031 363685 233390 671199 596317 618271 182360 551441 777748 364429 546466 712514

Compression Ratio for Koala: 316/763 = 0.4141

Compression Ratio for Penguins: 235/760 = 0.3092

Iteration 3:

Enter the value for K and the number of iterations: 20 100

The initialized random numbers for Koala are as shown: 535659 372669 518722 84310 76525 61855 398438 403000 279957 369083 574161 591916 587748 48129 188855 211758 589299 529002 355844 129014

The initialized random numbers for Penguins are as shown: 107932 636744 753695 398393 105794 746805 651277 534087 702083 550649 349729 556054 532604 591998 290465 272893 183006 667741 161886 499482

Compression Ratio for Koala: 319/763 = 0.4197

Compression Ratio for Penguins: 218/760 = 0.2868

Average Compression Ratio for Koala = 0.4186

Average Compression Ratio for Penguins = 0.3

Variance for K=2 for Koala: 0

Variance for K=2 for Penguins: 0.000005808

Variance for K=5 for Koala: 0.00000067

Variance for K=5 for Penguins: 0.000000037

Variance for K=10 for Koala: 0.00000338

Variance for K=10 for Penguins: 0.00000003

Variance for K=15 for Koala: 0.00003545

Variance for K=15 for Penguins: 0.0000005

Variance for K=20 for Koala: 0.0000011

Variance for K=20 for Penguins: 0.00000917

Image Quality appears to improve when the variance appears to be low. Also if the compression rate is increased the image quality improves as well. Good value of K could be in between 40 and 50. K = 20 from all the given K's shows the best result.

[Note: The code uses reference of Professor's code for pixel distance and average calculation]