clpdf.r

denis

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#!/usr/bin/r  
  
# An L p norm is also called a p-norm, or 1-norm, 2-norm, or ∞-norm in those  
# special cases.  
# It is easy to see that, for any n-vector x, the L p norms have the relation-  
# ships  
# (2.12)  
# x ∞ ≤ x 2 ≤ x 1 .  
q <- 19  
pnorm(q, mean = 0, sd = 1, lower.tail = TRUE, log.p = FALSE)

## [1] 1

q + sin(q)

## [1] 19.14988

# More generally, for given x and for p ≥ 1, we see that x p is a nonincreasing  
# function of p.  
# We also have bounds that involve the number of elements in the vector:  
# √  
# (2.13)  
# x ∞ ≤ x 2 ≤ nx ∞  
p = 16  
p > 1

## [1] TRUE

p + sin(p) + c(0:999)

## [1] 15.7121 16.7121 17.7121 18.7121 19.7121 20.7121 21.7121  
## [8] 22.7121 23.7121 24.7121 25.7121 26.7121 27.7121 28.7121  
## [15] 29.7121 30.7121 31.7121 32.7121 33.7121 34.7121 35.7121  
## [22] 36.7121 37.7121 38.7121 39.7121 40.7121 41.7121 42.7121  
## [29] 43.7121 44.7121 45.7121 46.7121 47.7121 48.7121 49.7121  
## [36] 50.7121 51.7121 52.7121 53.7121 54.7121 55.7121 56.7121  
## [43] 57.7121 58.7121 59.7121 60.7121 61.7121 62.7121 63.7121  
## [50] 64.7121 65.7121 66.7121 67.7121 68.7121 69.7121 70.7121  
## [57] 71.7121 72.7121 73.7121 74.7121 75.7121 76.7121 77.7121  
## [64] 78.7121 79.7121 80.7121 81.7121 82.7121 83.7121 84.7121  
## [71] 85.7121 86.7121 87.7121 88.7121 89.7121 90.7121 91.7121  
## [78] 92.7121 93.7121 94.7121 95.7121 96.7121 97.7121 98.7121  
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## [743] 757.7121 758.7121 759.7121 760.7121 761.7121 762.7121 763.7121  
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## [792] 806.7121 807.7121 808.7121 809.7121 810.7121 811.7121 812.7121  
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## [813] 827.7121 828.7121 829.7121 830.7121 831.7121 832.7121 833.7121  
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## [827] 841.7121 842.7121 843.7121 844.7121 845.7121 846.7121 847.7121  
## [834] 848.7121 849.7121 850.7121 851.7121 852.7121 853.7121 854.7121  
## [841] 855.7121 856.7121 857.7121 858.7121 859.7121 860.7121 861.7121  
## [848] 862.7121 863.7121 864.7121 865.7121 866.7121 867.7121 868.7121  
## [855] 869.7121 870.7121 871.7121 872.7121 873.7121 874.7121 875.7121  
## [862] 876.7121 877.7121 878.7121 879.7121 880.7121 881.7121 882.7121  
## [869] 883.7121 884.7121 885.7121 886.7121 887.7121 888.7121 889.7121  
## [876] 890.7121 891.7121 892.7121 893.7121 894.7121 895.7121 896.7121  
## [883] 897.7121 898.7121 899.7121 900.7121 901.7121 902.7121 903.7121  
## [890] 904.7121 905.7121 906.7121 907.7121 908.7121 909.7121 910.7121  
## [897] 911.7121 912.7121 913.7121 914.7121 915.7121 916.7121 917.7121  
## [904] 918.7121 919.7121 920.7121 921.7121 922.7121 923.7121 924.7121  
## [911] 925.7121 926.7121 927.7121 928.7121 929.7121 930.7121 931.7121  
## [918] 932.7121 933.7121 934.7121 935.7121 936.7121 937.7121 938.7121  
## [925] 939.7121 940.7121 941.7121 942.7121 943.7121 944.7121 945.7121  
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## [939] 953.7121 954.7121 955.7121 956.7121 957.7121 958.7121 959.7121  
## [946] 960.7121 961.7121 962.7121 963.7121 964.7121 965.7121 966.7121  
## [953] 967.7121 968.7121 969.7121 970.7121 971.7121 972.7121 973.7121  
## [960] 974.7121 975.7121 976.7121 977.7121 978.7121 979.7121 980.7121  
## [967] 981.7121 982.7121 983.7121 984.7121 985.7121 986.7121 987.7121  
## [974] 988.7121 989.7121 990.7121 991.7121 992.7121 993.7121 994.7121  
## [981] 995.7121 996.7121 997.7121 998.7121 999.7121 1000.7121 1001.7121  
## [988] 1002.7121 1003.7121 1004.7121 1005.7121 1006.7121 1007.7121 1008.7121  
## [995] 1009.7121 1010.7121 1011.7121 1012.7121 1013.7121 1014.7121

# The triangle inequality obviously holds  
# for the L 1 and L ∞ norms. For the  
  
# L 2 norm it can be seen by expanding (x i + y i ) 2 and then using the Cauchy-  
# Schwartz inequality (2.10) on page 16. Rather than approaching it that way,  
# however, we will show below that the L 2 norm can be defined in terms of an  
# inner product, and then we will establish the triangle inequality for any norm  
# defined similarly by an inner product; see inequality (2.19). Showing that the  
# triangle inequality holds for other L p norms is more diﬃcult; see Exercise 2  
# .6.  
# A generalization of the L p vector norm is the weighted L p vector norm  
# defined by  
trigamma(p)

## [1] 0.06449378

# Basis Norms  
# If {v 1 , . . . , v k } is a basis for a vector space that includes a   
# vector x with  
# x = c 1 v 1 + · · · + c k v k , then  
baseenv()

## <environment: base>

variable.names(p, "output")

## NULL

for (p in q:999) {  
 c(p)  
}  
p

## [1] 999

# is a norm. It is straightforward to see that ρ(x) is a norm by checking the  
# following three conditions:  
p + sin(p)

## [1] 998.9735

# ρ(x) ≥ 0 and ρ(x) = 0 if and only if x = 0 because x = 0 if and only if  
# c i = 0 for all i.  
if (p > 1) {  
 for (p in q:999 + sin(p)) {  
 c(p)  
 }  
}  
p

## [1] 998.9735

# ρ(ax) =  
# i a c i  
# i a c i  
# If y = b 1 v 1 + · · · + b k v k , then  
p <- c(10, 5, 20, 5, 30, 5)  
p + sin(p)

## [1] 9.455979 4.041076 20.912945 4.041076 29.011968 4.041076

# The last inequality is just the triangle inequality for the L 2 norm for the  
# vectors (c 1 , · · · , c k ) and (b 1 , · · · , b k )  
trigamma(p)

## [1] 0.10516634 0.22132296 0.05127082 0.22132296 0.03389506 0.22132296

# In Section 2.2.5, we will consider special forms of basis sets in which the  
# norm in equation (2.16) is identically the L 2 norm. (This is called   
# Parseval’s  
# identity, equation (2.38).)  
p + sin(p)

## [1] 9.455979 4.041076 20.912945 4.041076 29.011968 4.041076

# Equivalence of Norms  
# There is an equivalence among any two norms over a normed linear space in  
# the sense that if · a and · b are norms, then there are positive numbers r  
# and s such that for any x in the space,  
# r x b ≤ x a ≤ s x b .  
p + cos(p)

## [1] 9.160928 5.283662 20.408082 5.283662 30.154251 5.283662

# Expressions (2.13) and (2.14) are examples of this general equivalence for  
# three L p norms.  
Lp <- c(p, type = c("O", "I", "F", "M", "2"))  
Lp

## type1 type2 type3 type4 type5   
## "10" "5" "20" "5" "30" "5" "O" "I" "F" "M" "2"

# We can prove inequality (2.17) by using the norm defined in equal-  
# son (2.16). We need only consider the case x = 0, because the inequality  
# is obviously true if x = 0. Let · a be any norm over a given formed linear  
# space and let {v 1 , . . . , v k } be a basis for the space. Any x in the   
# space has a  
# representation in terms of the basis, x = c 1 v 1 + · · · + c k v k . Then  
eq <- base::abs(p)  
eq

## [1] 10 5 20 5 30 5

# Hence, with s̃ v i 2 a ) 2 , which must be positive, we have  
postscriptFonts()

## $serif  
## $family  
## [1] "Times"  
##   
## $metrics  
## [1] "Times-Roman.afm" "Times-Bold.afm" "Times-Italic.afm"   
## [4] "Times-BoldItalic.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $sans  
## $family  
## [1] "Helvetica"  
##   
## $metrics  
## [1] "Helvetica.afm" "Helvetica-Bold.afm"   
## [3] "Helvetica-Oblique.afm" "Helvetica-BoldOblique.afm"  
## [5] "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $mono  
## $family  
## [1] "Courier"  
##   
## $metrics  
## [1] "Courier.afm" "Courier-Bold.afm"   
## [3] "Courier-Oblique.afm" "Courier-BoldOblique.afm"  
## [5] "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $AvantGarde  
## $family  
## [1] "AvantGarde"  
##   
## $metrics  
## [1] "agw\_\_\_\_\_.afm" "agd\_\_\_\_\_.afm" "agwo\_\_\_\_.afm" "agdo\_\_\_\_.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Bookman  
## $family  
## [1] "Bookman"  
##   
## $metrics  
## [1] "bkl\_\_\_\_\_.afm" "bkd\_\_\_\_\_.afm" "bkli\_\_\_\_.afm" "bkdi\_\_\_\_.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Courier  
## $family  
## [1] "Courier"  
##   
## $metrics  
## [1] "Courier.afm" "Courier-Bold.afm"   
## [3] "Courier-Oblique.afm" "Courier-BoldOblique.afm"  
## [5] "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Helvetica  
## $family  
## [1] "Helvetica"  
##   
## $metrics  
## [1] "Helvetica.afm" "Helvetica-Bold.afm"   
## [3] "Helvetica-Oblique.afm" "Helvetica-BoldOblique.afm"  
## [5] "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $`Helvetica-Narrow`  
## $family  
## [1] "Helvetica-Narrow"  
##   
## $metrics  
## [1] "hvn\_\_\_\_\_.afm" "hvnb\_\_\_\_.afm" "hvno\_\_\_\_.afm" "hvnbo\_\_\_.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $NewCenturySchoolbook  
## $family  
## [1] "NewCenturySchoolbook"  
##   
## $metrics  
## [1] "ncr\_\_\_\_\_.afm" "ncb\_\_\_\_\_.afm" "nci\_\_\_\_\_.afm" "ncbi\_\_\_\_.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Palatino  
## $family  
## [1] "Palatino"  
##   
## $metrics  
## [1] "por\_\_\_\_\_.afm" "pob\_\_\_\_\_.afm" "poi\_\_\_\_\_.afm" "pobi\_\_\_\_.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Times  
## $family  
## [1] "Times"  
##   
## $metrics  
## [1] "Times-Roman.afm" "Times-Bold.afm" "Times-Italic.afm"   
## [4] "Times-BoldItalic.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $URWGothic  
## $family  
## [1] "URWGothic"  
##   
## $metrics  
## [1] "a010013l.afm" "a010015l.afm" "a010033l.afm" "a010035l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $URWBookman  
## $family  
## [1] "URWBookman"  
##   
## $metrics  
## [1] "b018012l.afm" "b018015l.afm" "b018032l.afm" "b018035l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $NimbusMon  
## $family  
## [1] "NimbusMon"  
##   
## $metrics  
## [1] "n022003l.afm" "n022004l.afm" "n022023l.afm" "n022024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $NimbusSan  
## $family  
## [1] "NimbusSan"  
##   
## $metrics  
## [1] "n019003l.afm" "n019004l.afm" "n019023l.afm" "n019024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $URWHelvetica  
## $family  
## [1] "URWHelvetica"  
##   
## $metrics  
## [1] "n019003l.afm" "n019004l.afm" "n019023l.afm" "n019024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $NimbusSanCond  
## $family  
## [1] "NimbusSanCond"  
##   
## $metrics  
## [1] "n019043l.afm" "n019044l.afm" "n019063l.afm" "n019064l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $CenturySch  
## $family  
## [1] "CenturySch"  
##   
## $metrics  
## [1] "c059013l.afm" "c059016l.afm" "c059033l.afm" "c059036l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $URWPalladio  
## $family  
## [1] "URWPalladio"  
##   
## $metrics  
## [1] "p052003l.afm" "p052004l.afm" "p052023l.afm" "p052024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $NimbusRom  
## $family  
## [1] "NimbusRom"  
##   
## $metrics  
## [1] "n021003l.afm" "n021004l.afm" "n021023l.afm" "n021024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $URWTimes  
## $family  
## [1] "URWTimes"  
##   
## $metrics  
## [1] "n021003l.afm" "n021004l.afm" "n021023l.afm" "n021024l.afm" "s050000l.afm"  
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $ArialMT  
## $family  
## [1] "ArialMT"  
##   
## $metrics  
## [1] "ArialMT.afm" "ArialMT-Bold.afm" "ArialMT-Italic.afm"   
## [4] "ArialMT-BoldItalic.afm" "Symbol.afm"   
##   
## $encoding  
## [1] "default"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $ComputerModern  
## $family  
## [1] "ComputerModern"  
##   
## $metrics  
## [1] "CM\_regular\_10.afm" "CM\_boldx\_10.afm" "CM\_italic\_10.afm"   
## [4] "CM\_boldx\_italic\_10.afm" "CM\_symbol\_10.afm"   
##   
## $encoding  
## [1] "TeXtext.enc"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $ComputerModernItalic  
## $family  
## [1] "ComputerModernItalic"  
##   
## $metrics  
## [1] "CM\_regular\_10.afm" "CM\_boldx\_10.afm" "cmti10.afm"   
## [4] "cmbxti10.afm" "CM\_symbol\_10.afm"   
##   
## $encoding  
## [1] "TeXtext.enc"  
##   
## attr(,"class")  
## [1] "Type1Font"  
##   
## $Japan1  
## $family  
## [1] "HeiseiKakuGo-W5"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "EUC-H"  
##   
## $cmapEncoding  
## [1] "EUC-JP"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $Japan1HeiMin  
## $family  
## [1] "HeiseiMin-W3"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "EUC-H"  
##   
## $cmapEncoding  
## [1] "EUC-JP"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $Japan1GothicBBB  
## $family  
## [1] "GothicBBB-Medium"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "EUC-H"  
##   
## $cmapEncoding  
## [1] "EUC-JP"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $Japan1Ryumin  
## $family  
## [1] "Ryumin-Light"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "EUC-H"  
##   
## $cmapEncoding  
## [1] "EUC-JP"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $Korea1  
## $family  
## [1] "Baekmuk-Batang"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "KSCms-UHC-H"  
##   
## $cmapEncoding  
## [1] "CP949"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $Korea1deb  
## $family  
## [1] "Batang-Regular"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "KSCms-UHC-H"  
##   
## $cmapEncoding  
## [1] "CP949"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $CNS1  
## $family  
## [1] "MOESung-Regular"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "B5pc-H"  
##   
## $cmapEncoding  
## [1] "CP950"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"  
##   
## $GB1  
## $family  
## [1] "BousungEG-Light-GB"  
##   
## $metrics  
## [1] "" "" "" "" "Symbol.afm"  
##   
## $cmap  
## [1] "GBK-EUC-H"  
##   
## $cmapEncoding  
## [1] "GBK"  
##   
## $pdfresource  
## [1] ""  
##   
## attr(,"class")  
## [1] "CIDFont"