

HW13 - Functions

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0.0.1 Problem 1

```
# Function takes the vector as input
f1 <- function(x = NULL) {
  if (is.null(x)) {
    return("Null input")
  }

  f11 <- function(y) {
    1/exp(y^2)
  }
  sapply(x, f11)
}

# function call
x <- c(0, 1, 100)
f1(x)
```

```
## [1] 1.000 0.368 0.000
```

0.0.2 Problem 2

```
kurtosis <- function(x = NULL) {
  if (is.null(x)) {
    return("Null input")
  }
  n <- length(x)
  mn <- mean(x)
  num <- (1/n) * sum((x - mn)^4)
  den <- ((1/n) * (sum((x - mn)^2)))^2
  (num/den) - 3
}

kurtosis(c(1:10))
```

```
## [1] -1.22
```

0.0.3 Problem 3(a)

```
perPay <- function(Pr, r, n) {
  Pr/(1 - (1/(1 + r)^n))
}
```

0.0.4 Problem 3(b)

```
do.call(perPay, list(1e+05, 0.01, 300))
```

```
## [1] 105322
```

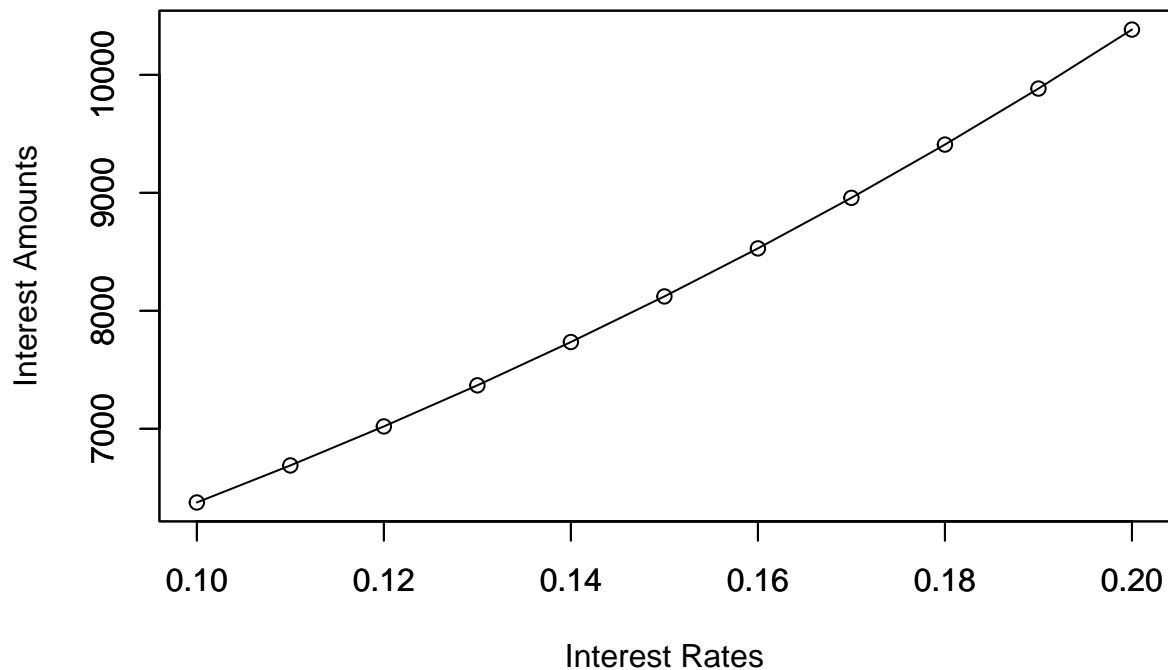
0.0.5 Problem 4 (a)

```
totamt <- function(p, n, r) {  
  sapply(r, function(r1) {  
    p * (((1 + r1)^n - 1)/r1)  
  })  
}  
intr <- totamt(400, 10, seq(0.1, 0.2, 0.01))  
intr
```

```
## [1] 6375 6689 7019 7368 7735 8121 8529 8957 9409 9884 10383
```

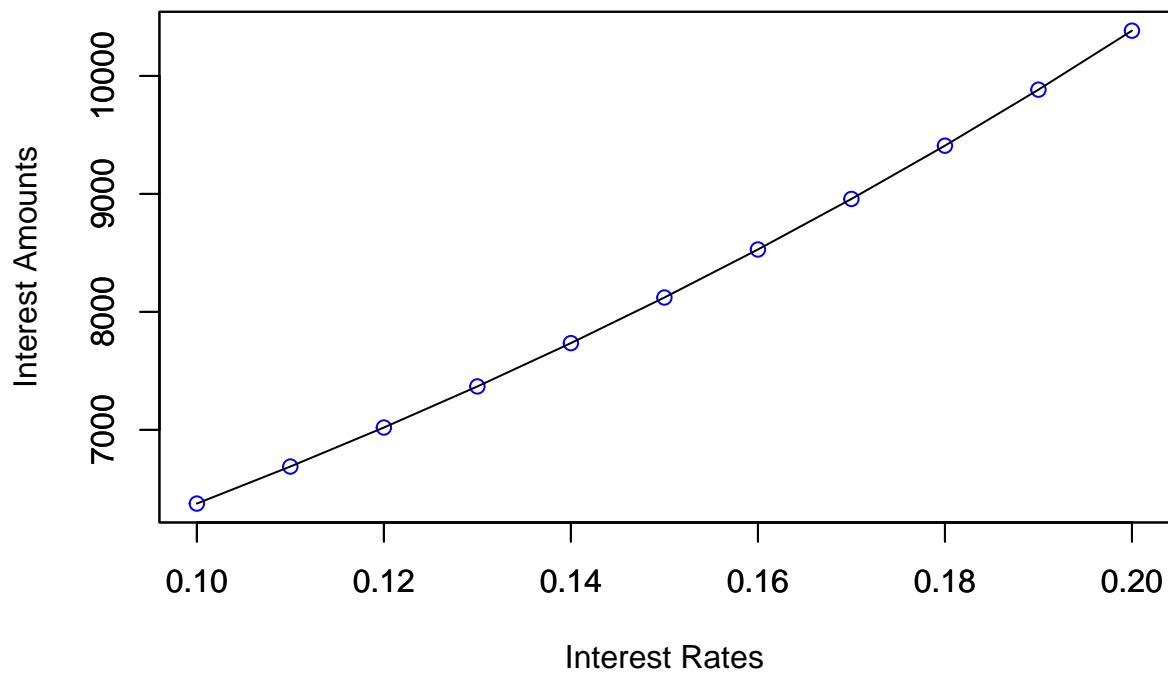
0.0.6 Problem 4 (b)

```
plot(seq(0.1, 0.2, 0.01), intr, xlab = "Interest Rates", ylab = "Interest Amounts")  
par(new = TRUE)  
plot(seq(0.1, 0.2, 0.01), intr, type = "l", xlab = "", ylab = "")
```



0.0.7 Problem 4 (c)

```
totamt1 <- function(p, n, r) {  
  intr <- sapply(r, function(r1) {  
    p * (((1 + r1)^n - 1)/r1)  
  })  
  plot(seq(0.1, 0.2, 0.01), intr, xlab = "Interest Rates",  
       ylab = "Interest Amounts", col = "blue")  
  par(new = TRUE)  
  plot(seq(0.1, 0.2, 0.01), intr, type = "l", xlab = "", ylab = "")  
}  
totamt1(400, 10, seq(0.1, 0.2, 0.01))
```



0.1 Document Information.

All of the statistical analyses in this document will be performed using R version 4.1.0 (2021-05-18). R packages used will be maintained using the packrat dependency management system.

```
sessionInfo()
```

```
## R version 4.1.0 (2021-05-18)  
## Platform: x86_64-w64-mingw32/x64 (64-bit)  
## Running under: Windows 10 x64 (build 19041)  
##  
## Matrix products: default  
##  
## locale:
```

```

## [1] LC_COLLATE=English_United States.1252
## [2] LC_CTYPE=English_United States.1252
## [3] LC_MONETARY=English_United States.1252
## [4] LC_NUMERIC=C
## [5] LC_TIME=English_United States.1252
##
## attached base packages:
## [1] grid      stats      graphics  grDevices utils      datasets  methods
## [8] base
##
## other attached packages:
## [1] Rcpp_1.0.7      jtools_2.1.3      dobson_0.4      Matrix_1.3-4
## [5] psych_2.1.6     leaps_3.1          faraway_1.0.7   xtable_1.8-4
## [9] lmtest_0.9-38   zoo_1.8-9          PairedData_1.1.1 mvtnorm_1.1-2
## [13] gld_2.6.2       ggpubr_0.4.0       car_3.0-11      carData_3.0-4
## [17] mnormt_2.0.2    vcd_1.4-8          epiDisplay_3.5.0.1 nnet_7.3-16
## [21] foreign_0.8-81  Hmisc_4.5-0        Formula_1.2-4   survival_3.2-11
## [25] lattice_0.20-44 MASS_7.3-54        ggplot2_3.3.5   rmarkdown_2.8
## [29] knitr_1.33
##
## loaded via a namespace (and not attached):
## [1] nlme_3.1-152      RColorBrewer_1.1-2 tools_4.1.0
## [4] backports_1.2.1   utf8_1.2.1         R6_2.5.0
## [7] rpart_4.1-15      colorspace_2.0-1   withr_2.4.2
## [10] tidyselect_1.1.1  gridExtra_2.3      curl_4.3.1
## [13] compiler_4.1.0    formatR_1.11       htmlTable_2.2.1
## [16] scales_1.1.1      checkmate_2.0.0    proxy_0.4-26
## [19] stringr_1.4.0     digest_0.6.27      minqa_1.2.4
## [22] rio_0.5.27        base64enc_0.1-3     jpeg_0.1-8.1
## [25] pkgconfig_2.0.3   htmltools_0.5.1.1  lme4_1.1-27.1
## [28] highr_0.9         htmlwidgets_1.5.3  rlang_0.4.11
## [31] readxl_1.3.1      rstudioapi_0.13    generics_0.1.0
## [34] dplyr_1.0.7       zip_2.2.0           magrittr_2.0.1
## [37] munsell_0.5.0     fansi_0.5.0         abind_1.4-5
## [40] lifecycle_1.0.0   stringi_1.6.1       yaml_2.2.1
## [43] parallel_4.1.0    forcats_0.5.1       crayon_1.4.1
## [46] lmom_2.8          haven_2.4.1         splines_4.1.0
## [49] pander_0.6.4      hms_1.1.0           tmvnsim_1.0-2
## [52] pillar_1.6.1      boot_1.3-28         ggsignif_0.6.2
## [55] glue_1.4.2        evaluate_0.14       latticeExtra_0.6-29
## [58] data.table_1.14.0 nloptr_1.2.2.2      png_0.1-7
## [61] vctrs_0.3.8       cellranger_1.1.0    gtable_0.3.0
## [64] purrr_0.3.4       tidyr_1.1.3         xfun_0.23
## [67] openxlsx_4.2.4    broom_0.7.8         e1071_1.7-7
## [70] rstatix_0.7.0     class_7.3-19        tibble_3.1.2
## [73] cluster_2.1.2     ellipsis_0.3.2

```