

Package ‘EngrEcon’

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Title Engineering Economics Analysis for Engineering Projects Cost Analysis

Version 1.0.0

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Description Computing economic analysis in civil infrastructure and ecosystem restoration projects is a typical activity. This package contains Standard cost engineering and engineering economics methods that are applied to convert between present, future, and annualized costs. Newnan D. (2020) <ISBN 9780190931919> “Engineering Economic Analysis”.

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URL GitHub (<<https://github.com/USACE-WRISES>>)

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Depends R (>= 4.1.0)

NeedsCompilation no

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Contents

annual_to_future	2
annual_to_present	3
cashflow	4
effective_i	5
future_to_annual	6
future_to_present	7
gradient_to_annual	8
gradient_to_future	9
gradient_to_present	10
interest_during_construction	11

om_distribute 12

present_to_annual 13

present_to_future 14

Index 15

annual_to_future	<i>Calculate future value from a uniform annual payment</i>
annual_to_future	<i>Compute future values from uniform annual payments using uniform series compound amount factor (uscaf)</i>

Description

Calculate future value from a uniform annual payment

annual_to_future Compute future values from uniform annual payments using uniform series compound amount factor (uscaf)

Usage

annual_to_future(i, n, A)

Arguments

- i discount rate in percent per year
- n life span in years
- A series of uniform annual payments

Value

FV

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: FV = 5664161
annual_to_future(0.08, 30, 50000)
```

annual_to_present	<i>Calculate present value from a uniform annual payment</i>
annual_to_present	<i>Compute present value from uniform annual payments using uniform series present worth factor (uswf)</i>

Description

Calculate present value from a uniform annual payment

annual_to_present Compute present value from uniform annual payments using uniform series present worth factor (uswf)

Usage

```
annual_to_present(i, n, A)
```

Arguments

i	discount rate in percent per year
n	life span in years
A	series of uniform annual payments

Value

pr.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: pr.value = $337733.5
annual_to_present(0.08, 30, 30000)
```

cashflow	<i>Calculate present value and annual value from a given future payments of cash flows cashflow Compute a given cash flow data's present value and annual value. The first column is the cash flow year;the rest is the cash flow money. The number of rows is the lifespan</i>
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Description

Calculate present value and annual value from a given future payments of cash flows

cashflow Compute a given cash flow data's present value and annual value. The first column is the cash flow year;the rest is the cash flow money. The number of rows is the lifespan

Usage

```
cashflow(i, cashflowdata)
```

Arguments

i	annual interest rate in percentage
cashflowdata	cash flow data containing the life span and money value of the cash flow for each year

Value

cash.flow.table

Examples

```
# Result : cash.flow.table
# Result : future value = 232540.78
# Result : present value = 206330.96
year = c(1:5)
capital = c(63000,1300,1300,1600,1300)
year1 = c(60000,0,10000,0,0)
year2 = c(0,0,30000,50000,0)
cashflowdata <- data.frame (year, capital, year1, year2)
cashflow(0.055, cashflowdata)
```

effective_i	<i>Calculate effective annual interest rate for a known nominal rate and compounding period per year effective_i Compute future value nominal rate and compounding period per year, and frequency.</i>
-------------	--

Description

Calculate effective annual interest rate for a known nominal rate and compounding period per year
 effective_i Compute future value nominal rate and compounding period per year, and frequency.

Usage

```
effective_i(r, m = c("yearly", "quarterly", "monthly"))
```

Arguments

r	nominal interest rate in decimal number
m	number of compounding period per year monthly = 12 Quarterly = 4 yearly = 1

Value

effective_i

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. (2020). Engineering Economic Analysis (14th ed.). New York, Oxford University Press.

David, W., & Terry, R. (2012). Fundamentals of Engineering Economics and Decision Analysis. Springer Nature.

Examples

```
# Result: effective_i =  
effective_i (0.08, m = "yearly")
```

future_to_annual	<i>Compute annual payment value from future value future_to_annual calculate annual value from future value using the accumulated amount after years using sinking fund factor (sff)</i>
------------------	--

Description

Compute annual payment value from future value

future_to_annual calculate annual value from future value using the accumulated amount after years using sinking fund factor (sff)

Usage

future_to_annual(i, n, FV)

Arguments

- i discount rate in percent per year
- n life span in years
- FV accumulated (future) value

Value

A

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: A = 5737.83
future_to_annual(0.08, 30, 650000)
```

future_to_present	<i>Compute present values from future payments (or cash flow)</i>
future_to_present	<i>calculate present value from future value using present worth factor (pwf)</i>

Description

Compute present values from future payments (or cash flow)

future_to_present calculate present value from future value using present worth factor (pwf)

Usage

```
future_to_present(i, n, FV)
```

Arguments

i	discount rate in percent per year
n	life span in years
FV	future value

Value

pr.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: pr.value = 2981.32
future_to_present(0.08, 30, 30000)
```

gradient_to_annual	<i>Calculate annual value from uniform gradient payment</i>
gradient_to_annual	<i>Compute annual value from uniform gradient payments using uniform gradient present worth factor (ugaw)</i>

Description

Calculate annual value from uniform gradient payment

gradient_to_annual Compute annual value from uniform gradient payments using uniform gradient present worth factor (ugaw)

Usage

```
gradient_to_annual(i, n, G, A)
```

Arguments

i	discount rate in percent per year
n	life span in years
G	uniform gradient payments
A	initial annual payment

Value

ann.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: ann.value = $ 105138.30
gradient_to_annual(0.08, 30, 6000, 50000)
```

gradient_to_future	<i>Calculate future value from uniform gradient payment</i>
gradient_to_future	<i>Compute future value from uniform gradient payments using uniform gradient present worth factor (ugfw)</i>

Description

Calculate future value from uniform gradient payment

gradient_to_future Compute future value from uniform gradient payments using uniform gradient present worth factor (ugfw)

Usage

```
gradient_to_future(i, n, G)
```

Arguments

i	discount rate in percent per year
n	life span in years
G	uniform gradient payments

Value

fr.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: fr.value = $ 312312
gradient_to_future(0.08, 30,300)
```

gradient_to_present	<i>Calculate present value from uniform gradient payment</i>
gradient_to_present	<i>Compute present value from uniform gradient payments using uniform gradient present worth factor (ugpw)</i>

Description

Calculate present value from uniform gradient payment

gradient_to_present Compute present value from uniform gradient payments using uniform gradient present worth factor (ugpw)

Usage

```
gradient_to_present(i, n, G)
```

Arguments

i	discount rate in percent per year
n	life span in years
G	uniform gradient payments

Value

pr.value

References

#' Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: pr.value = 310367.40
gradient_to_present(0.08, 30, 3000)
```

interest_during_construction				
	<i>Compute</i>	<i>interest</i>	<i>during</i>	<i>construction</i>
	interest_during_construction	calculate	interest	during construction using a monthly discount factor

Description

Compute interest during construction

interest_during_construction calculate interest during construction using a monthly discount factor

Usage

interest_during_construction(i, duration, capital)

Arguments

i	interest rate in percent per year
duration	construction duration in months
capital	first/capital cost

Value

idc

References

Engineer, U. S. A., & Resources, W. National Economic Development (NED) Procedures Manual- National Development Costs. U.S. Army Corps of Engineers Humphreys Engineer Center Support Activity Institute for Water Resources, DACWC72-90(June)1993.

Examples

```
# Result: idc ($) = 18992.14
interest_during_construction (0.027, 25, 700000)
```

om_distribute	<i>Calculate the present value of periodic operations and maintenance costs</i> <i>om_distribute Distribute periodic present value operations and maintenance costs over a project life span, discount over project, and compute present value</i>
---------------	---

Description

Calculate the present value of periodic operations and maintenance costs

om_distribute Distribute periodic present value operations and maintenance costs over a project life span, discount over project, and compute present value

Usage

om_distribute(i, n, fq, OM)

Arguments

- i discount rate in percent per year
- n life span in years
- fq frequency of cost in years
- OM operation and maintenance cost incurred at each interval in present value

Value

OM_dist

References

Add citation as needed.

Examples

```
#Result is the present value cost of periodic operations and maintenance expenses.  
# Result: idc ($) = 8174.547  
om_distribute(0.03, 50, 3, 1000)
```

present_to_annual	<i>Compute annual payment from present value</i>	present_to_annual
	<i>Compute uniform series annual payments from present value using capital recovery factor (crf)</i>	

Description

Compute annual payment from present value

present_to_annual Compute uniform series annual payments from present value using capital recovery factor (crf)

Usage

```
present_to_annual(i, n, PV)
```

Arguments

i	discount rate in percent per year
n	life span in years
PV	present value

Value

ann.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: ann.value = $17765.49
present_to_annual(0.08, 30, 200000)
```

present_to_future	<i>Compute future values from present value</i>
-------------------	---

Description

present_to_future calculate future value from present value using compound amount factor (caf)

Usage

```
present_to_future(i, n, PV)
```

Arguments

i	discount rate in percent per year
n	life span in years
PV	present value

Value

fr.value

References

Newnan, D. G., Eschenbach, T. G., Lavelle, J. P., & Oxford, N. Y. Engineering Economic Analysis, 14th ed. New York, Oxford University Press, 2020

David, W., & Terry, R. Fundamentals of Engineering Economics and Decision Analysis. Springer Nature, 2012

Examples

```
# Result: fr.value = 9056391  
  
present_to_future (0.08, 30, 900000)
```

Index

annual_to_future, [2](#)
annual_to_present, [3](#)

cashflow, [4](#)

effective_i, [5](#)

future_to_annual, [6](#)
future_to_present, [7](#)

gradient_to_annual, [8](#)
gradient_to_future, [9](#)
gradient_to_present, [10](#)

interest_during_construction, [11](#)

om_distribute, [12](#)

present_to_annual, [13](#)
present_to_future, [14](#)