In[1]:=
```
(** EXERCISE 1 A **)
```

In[2]:=
```
P = 10 000;
r = 0.1 ;
frequency = 1.0 ;
```

In[5]:=
```
(** count convention: 30/360 US **)

(* 28.02.2017 - 28.02.2018 *)
ΔYears = 2018 - 2017 ;
ΔMonths = 2 - 2 ;
ΔDays = 30 - 30;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360

(* 28.02.2018 - 28.02.2019 *)
ΔYears = 2019 - 2018 ;
ΔMonths = 2 - 2 ;
ΔDays = 30 - 30;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360

(* 28.02.2019 - 28.02.2020 *)
ΔYears = 2020 - 2019 ;
ΔMonths = 2 - 2 ;
ΔDays = 30 - 30;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360
```

Out[9]=
```
1000.
```

Out[14]=
```
1000.
```

Out[19]=
```
1000.
```

In[20]:=
```
(** count convention: 30E/360 **)

(* 28.02.2017 - 28.02.2018 *)
ΔYears = 2018 - 2017 ;
ΔMonths = 2 - 2 ;
ΔDays = 28 - 28;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360

(* 28.02.2018 - 28.02.2019 *)
ΔYears = 2019 - 2018 ;
ΔMonths = 2 - 2 ;
ΔDays = 28 - 28;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360

(* 28.02.2019 - 28.02.2020 *)
ΔYears = 2020 - 2019 ;
ΔMonths = 2 - 2 ;
ΔDays = 29 - 28;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays
accruedIntrest = P * r * dayCount / 360
```

Out[24]= 1000.

Out[29]= 1000.

Out[33]= 361

Out[34]= 1002.78

In[35]:=

In[36]:=
```
(** count convention: ACT/ACT (ICMA) **)

(* 28.02.2017 - 28.02.2018 *)
accruedIntrest = P * r

(* 28.02.2018 - 28.02.2019 *)
accruedIntrest = P * r

(* 28.02.2019 - 28.02.2020 *)
accruedIntrest = P * r
```

Out[36]= 1000.

Out[37]= 1000.

Out[38]= 1000.

In[45]:=
```
(** count convention: ACT 365 (fixed) **)

(* 28.02.2017 - 28.02.2018 *)

dayCount = DateDifference[{2017, 2, 28}, {2018, 2, 28}]
accruedIntrest = P * r * dayCount[[1]] / 365

(* 28.02.2018 - 28.02.2019 *)

dayCount = DateDifference[{2018, 2, 28}, {2019, 2, 28}]
accruedIntrest = P * r * dayCount[[1]] / 365

(* 28.02.2019 - 28.02.2020 *)
dayCount = DateDifference[{2019, 2, 28}, {2020, 2, 29}]
accruedIntrest = P * r * dayCount[[1]] / 365
```

Out[45]= 365 days

Out[46]= 1000.

Out[47]= 365 days

Out[48]= 1000.

Out[49]= 366 days

Out[50]= 1002.74

In[39]:=
```
(** count convention: ACT 360 **)

(* 28.02.2017 - 28.02.2018 *)

dayCount = DateDifference[{2017, 2, 28}, {2018, 2, 28}]
accruedIntrest = P * r * dayCount[[1]] / 360

(* 28.02.2018 - 28.02.2019 *)

dayCount = DateDifference[{2018, 2, 28}, {2019, 2, 28}]
accruedIntrest = P * r * dayCount[[1]] / 360

(* 28.02.2019 - 28.02.2020 *)
dayCount = DateDifference[{2019, 2, 28}, {2020, 2, 29}]
accruedIntrest = P * r * dayCount[[1]] / 360
```

Out[39]= 365 days

Out[40]= 1013.89

Out[41]= 365 days

Out[42]= 1013.89

Out[43]= 366 days

Out[44]= 1016.67

☺ (** EXERCISE 1 B **)

(* Consider a 10-year bond with maturity
on 29th February 2020. The bond has nominal
value of 10 000 EUR and coupon rate of 10
%.Coupons are paid annually in the end of
February (EOM). For a transaction done on the 17
th October 2019 the clean price was 99,80.
Compute accrued interest and dirty price
(cash flow) paid on the spot date (D+2). *)

(** The spot date(D+2) in case of 17
th of October (Thursday) is 21th of October (Monday)

date1 = 28.02.2019 – starting date for the accrual
date2 = 21.10.2019 –
date through which interest is being accrued. (settlement date of the trade)
date3 = 29.02.2019
**)

In[106]:=
```
P = 10 000 ;
r = 0.1 ;
frequency = 1.0 ;
CleanPrice = 0.9980 * P
```
Out[109]= 9980.

```
(** count convention: 30/360 US **)
ΔYears = 2019 - 2019 ;
ΔMonths = 10 - 2 ;
ΔDays = 21 - 30;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360
DirtyPrice = CleanPrice + accruedIntrest
```

Out[98]= 641.667

Out[99]= 10 621.7

In[100]:=
```
(** count convention: 30E/360 **)
ΔYears = 2019 - 2019 ;
ΔMonths = 10 - 2 ;
ΔDays = 21 - 28;
dayCount = ΔYears * 360 + ΔMonths * 30 + ΔDays ;
accruedIntrest = P * r * dayCount / 360
DirtyPrice = CleanPrice + accruedIntrest
```

Out[104]= 647.222

Out[105]= 10 627.2

In[113]:=
```
(** count convention: ACT/ACT (ICMA) **)

dayDifference12 = DateDifference[{2019, 2, 28}, {2019, 10, 21}]
dayDifference13 = DateDifference[{2019, 2, 28}, {2020, 2, 29}]
accruedIntrest = P * r * dayDifference12[[1]] / (dayDifference13[[1]] * frequency)
DirtyPrice = CleanPrice + accruedIntrest
```

Out[113]= 235 days

Out[114]= 366 days

Out[115]= 642.077

Out[116]= 10 622.1

In[117]:=
```
(** count convention: ACT 365 (fixed) **)

dayDifference = DateDifference[{2019, 2, 28}, {2019, 10, 21}]
accruedIntrest = P * r * dayDifference[[1]] / 365
DirtyPrice = CleanPrice + accruedIntrest
```

Out[117]= 235 days

Out[118]= 643.836

Out[119]= 10 623.8

In[120]:=
```
(** count convention: ACT 360 **)

dayDifference = DateDifference[{2019, 2, 28}, {2019, 10, 21}]
accruedIntrest = P * r * dayDifference[[1]] / 360
DirtyPrice = CleanPrice + accruedIntrest
```

Out[120]= 235 days

Out[121]= 652.778

Out[122]= 10 632.8