Assignment #8

P391 #34

Let t = time (in years) deposits have been in accounts

$M(t)$ = the balance (\$) in Monica's account in t years

$T(t)$ = the balance (\$) in Tom's account in t years

$M(t) = 1000\,e^{0.045t}$

$T(t) = 1000\,(1.045)^t$

a) After 1 year the balance in Monica's account is

$\$M(1) = \$1000\,e^{0.045(1)} \approx \$1046$

Tom's balance after 1 year is

$\$\,T(1) = \$1000(1.045)^1 \approx \$1045$

b) After 10 years their respective balances are as follows -

Monica: $\$M(10) \approx \$1000\,e^{0.045(10)} \approx \$1568.30$

Tom: $\$T(10) \approx \$1000(1.045)^{10} \approx \$1553.00$

Continuous compounding yields more interest than annual compounding.

p.391 #36

t = the number of years from now

$P(t)$ = the peak demand for electric power (MW) in Gondwanaland t years from now.

$P(t) = 26{,}000\,e^{0.03t}$

$P(15) = 26000\,e^{0.03(15)} \approx 40776.12$

In 15 years the peak demand will be about 40776.12 MW.

P.391 #44

Let $D(t)$ = Donna's balance (\$) in t years

$J(t)$ = Jesse's balance (\$) in t years

$$D(t) = 10{,}000\left(1.00 + \frac{0.04}{365}\right)^{365t} \approx 10000(1.040808)^t$$

$$J(t) = 5{,}000\left(1.00 + \frac{0.05}{365}\right)^{365t} \approx 5000(1.051267)^t$$

Is there a t such that $J(t) = D(t)$?

Yes when $t \approx 69.32$ we have

$J(t) \approx D(t) \approx \$160{,}025$.

The screen shot below illustrates our result.

The balances in the accounts would be equal after about 69.32 years.