BACS HW14
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Due: 2022/05/22
Special thanks to 108071001

Question 1. Let's talk about the package `seminr` first. It is hard to install. If some error occurs, you may consider:

- Update `R` to version 4.1.3. or above.
- Install another package called `xfun` then reinstall `seminr`

(a) May follow the codes on the print.

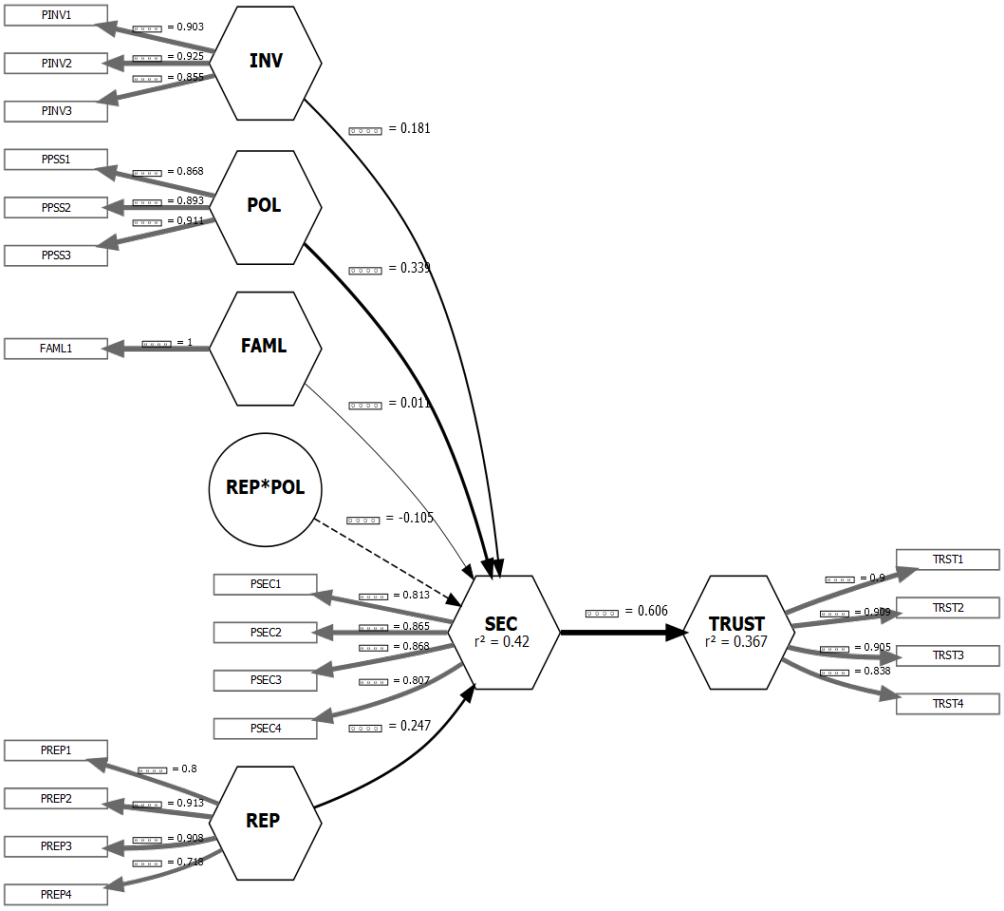
```
library("seminr")

# Question 1 (a)
sec <- read.csv("security_data_sem.csv")
sec_intxn_mm <- constructs(
  composite("TRUST", multi_items("TRST", 1:4)),
  composite("SEC", multi_items("PSEC", 1:4)),
  composite("REP", multi_items("PREP", 1:4)),
  composite("INV", multi_items("PINV", 1:3)),
  composite("POL", multi_items("PPSS", 1:3)),
  composite("FAML", single_item("FAML1")),
  interaction_term(iv="REP",moderator="POL",method=orthogonal)
)

# Structural Model
sec_intxn_sm <- relationships(
    paths(from = c("REP", "INV", "POL", "FAML", "REP*POL"), to = "SEC"),
    paths(from = "SEC", to = "TRUST")
)

# estimate the models using PLS
sec_pls <- estimate_pls(
  data = sec,
  measurement_model = sec_intxn_mm,
  structural_model = sec_intxn_sm
)
```

(b) I save the weights to a `.csv` file, then convert into LaTeXtable by online tools.

```
# Question 1 (b)
# (i) Plot a figure of the estimated model
save_plot(filename = "1b_plot.png",
          plot = plot(sec_pls),
          width = 1060,
          height = 960)

# (ii) Weights and loadings of composites
sec_report <- summary(sec_pls)
write.table(round(sec_report$weights, digits=3),
            file="1b_weights.csv",
            sep = ",",
            col.names=NA)
write.table(round(sec_report$loadings, digits=3),
            file="1b_loadings.csv",
            sep = ",",
```

```
            col.names=NA)

# (iii) Regression coefficients of paths between factors
write.table(round(sec_report$paths, digits=3),
            file="1b_paths.csv",
            sep = ",",
            col.names=NA)

# (iv) Bootstrapped path coefficients
boot_pls <- bootstrap_model(sec_pls , nboot = 1000)
boot_report <- summary(boot_pls)
write.table(round(boot_report$bootstrapped_paths, digits=3),
            file="1b_boot_paths.csv",
            sep = ",",
            col.names=NA)
```

(i) The figure of the estimated model:



(ii) Weights and loadings of composites: please refer to the table 1 and table 2 in the attachments.

(iii) Regression coefficients of paths between factors

	SEC	TRUST
R^2	0.42	0.367
AdjR^2	0.412	0.365
REP	0.247	NA
INV	0.181	NA
POL	0.339	NA
FAML	0.011	NA
REP*POL	-0.105	NA
SEC	NA	0.606

(iv) Bootstrapped path coefficients: t-values, 95% CI

	Original Est.	Bootstrap Mean	Bootstrap SD	T Stat.	2.5% CI	97.5% CI
REP ->SEC	0.247	0.245	0.058	4.29	0.13	0.355
INV ->SEC	0.181	0.185	0.057	3.147	0.077	0.294
POL ->SEC	0.339	0.345	0.055	6.154	0.24	0.448
FAML ->SEC	0.011	0.006	0.058	0.181	-0.107	0.115
REP*POL ->SEC	-0.105	-0.019	0.126	-0.83	-0.192	0.193
SEC ->TRUST	0.606	0.609	0.035	17.416	0.532	0.675

■

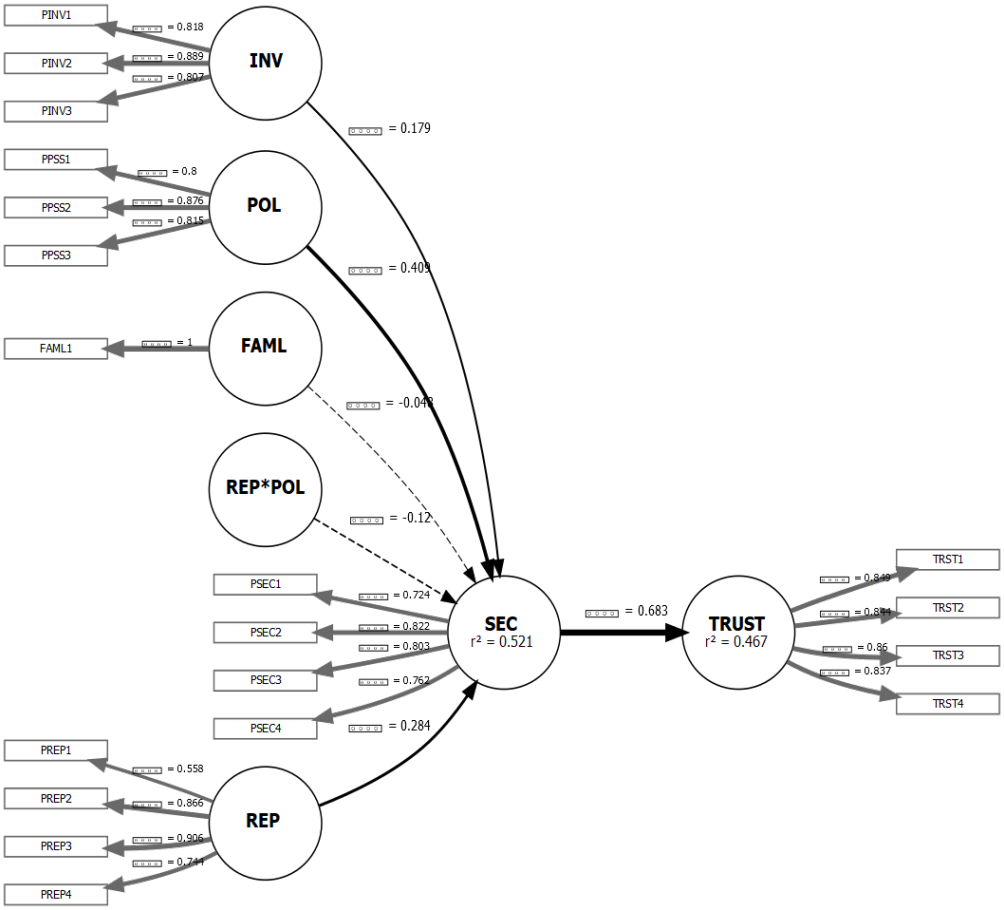
Question 2. (a) Follow the codes on the print.

```
# Question 2 (a)
sec_cf_mm <- constructs(
  reflective("TRUST", multi_items("TRST", 1:4)),
  reflective("SEC", multi_items("PSEC", 1:4)),
  reflective("REP", multi_items("PREP", 1:4)),
  reflective("INV", multi_items("PINV", 1:3)),
  reflective("POL", multi_items("PPSS", 1:3)),
  reflective("FAML", multi_items("FAML", 1:1)),
  interaction_term(iv="REP",moderator="POL",method=orthogonal)
)

sec_cf_pls <- estimate_pls(
  data = sec,
  measurement_model = sec_cf_mm,
  structural_model = sec_intxn_sm
)
```

(b) Similar to 1(b).

```
# Question 2 (b)
# (i) Plot a figure of the estimated model
save_plot(filename = "2b_plot.png",
          plot = plot(sec_cf_pls),
          width = 1060,
          height = 960)

# (ii) Loadings of composites
sec_cf_report <- summary(sec_cf_pls)
write.table(round(sec_cf_report$loadings, digits=3),
            file="2b_loadings.csv",
            sep = ",",
            col.names=NA)

# (iii) Regression coefficients of paths between factors, and their p-values
write.table(round(sec_cf_report$paths, digits=3),
            file="2b_paths.csv",
            sep = ",",
            col.names=NA)
```

(i) The figure of the estimated model



(ii) Loadings of composites: Please refer to table 3 in the attachments.

(iii) Regression coefficients of paths between factors, and their p-values

	SEC	TRUST
R^2	0.521	0.467
AdjR^2	0.515	0.466
REP	0.284	NA
INV	0.179	NA
POL	0.409	NA
FAML	-0.048	NA
REP*POL	-0.12	NA
SEC	NA	0.683

■

Attachments. The tables.

Table 1: Weights of composites in 1(b)

	REP	INV	POL	FAML	REP*POL	SEC	TRUST
TRST1	0	0	0	0	0	0	0.282
TRST2	0	0	0	0	0	0	0.28
TRST3	0	0	0	0	0	0	0.286
TRST4	0	0	0	0	0	0	0.278
PSEC1	0	0	0	0	0	0.277	0
PSEC2	0	0	0	0	0	0.315	0
PSEC3	0	0	0	0	0	0.307	0
PSEC4	0	0	0	0	0	0.292	0
PREP1	0.215	0	0	0	0	0	0
PREP2	0.334	0	0	0	0	0	0
PREP3	0.349	0	0	0	0	0	0
PREP4	0.287	0	0	0	0	0	0
PINV1	0	0.363	0	0	0	0	0
PINV2	0	0.395	0	0	0	0	0
PINV3	0	0.358	0	0	0	0	0
PPSS1	0	0	0.36	0	0	0	0
PPSS2	0	0	0.395	0	0	0	0
PPSS3	0	0	0.367	0	0	0	0
FAML1	0	0	0	1	0	0	0
PREP1*PPSS1	0	0	0	0	0.239	0	0
PREP1*PPSS2	0	0	0	0	0.031	0	0
PREP1*PPSS3	0	0	0	0	0.021	0	0
PREP2*PPSS1	0	0	0	0	0.046	0	0
PREP2*PPSS2	0	0	0	0	-0.104	0	0
PREP2*PPSS3	0	0	0	0	-0.228	0	0
PREP3*PPSS1	0	0	0	0	-0.341	0	0
PREP3*PPSS2	0	0	0	0	0.095	0	0
PREP3*PPSS3	0	0	0	0	0.108	0	0
PREP4*PPSS1	0	0	0	0	0.443	0	0
PREP4*PPSS2	0	0	0	0	0.382	0	0
PREP4*PPSS3	0	0	0	0	0.271	0	0

Table 2: Loadings of composites in 1(b)

	REP	INV	POL	FAML	REP*POL	SEC	TRUST
TRST1	0	0	0	0	0	0	0.9
TRST2	0	0	0	0	0	0	0.909
TRST3	0	0	0	0	0	0	0.905
TRST4	0	0	0	0	0	0	0.838
PSEC1	0	0	0	0	0	0.813	0
PSEC2	0	0	0	0	0	0.865	0
PSEC3	0	0	0	0	0	0.868	0
PSEC4	0	0	0	0	0	0.807	0
PREP1	0.8	0	0	0	0	0	0
PREP2	0.913	0	0	0	0	0	0
PREP3	0.908	0	0	0	0	0	0
PREP4	0.718	0	0	0	0	0	0
PINV1	0	0.903	0	0	0	0	0
PINV2	0	0.925	0	0	0	0	0
PINV3	0	0.855	0	0	0	0	0
PPSS1	0	0	0.868	0	0	0	0
PPSS2	0	0	0.893	0	0	0	0
PPSS3	0	0	0.911	0	0	0	0
FAML1	0	0	0	1	0	0	0
PREP1*PPSS1	0	0	0	0	0.581	0	0
PREP1*PPSS2	0	0	0	0	0.51	0	0
PREP1*PPSS3	0	0	0	0	0.506	0	0
PREP2*PPSS1	0	0	0	0	0.509	0	0
PREP2*PPSS2	0	0	0	0	0.421	0	0
PREP2*PPSS3	0	0	0	0	0.336	0	0
PREP3*PPSS1	0	0	0	0	0.236	0	0
PREP3*PPSS2	0	0	0	0	0.555	0	0
PREP3*PPSS3	0	0	0	0	0.466	0	0
PREP4*PPSS1	0	0	0	0	0.9	0	0
PREP4*PPSS2	0	0	0	0	0.836	0	0
PREP4*PPSS3	0	0	0	0	0.859	0	0

Table 3: Loadings of composites in 2(b)

	REP	INV	POL	FAML	REP*POL	SEC	TRUST
TRST1	0	0	0	0	0	0	0.849
TRST2	0	0	0	0	0	0	0.844
TRST3	0	0	0	0	0	0	0.86
TRST4	0	0	0	0	0	0	0.837
PSEC1	0	0	0	0	0	0.724	0
PSEC2	0	0	0	0	0	0.822	0
PSEC3	0	0	0	0	0	0.803	0
PSEC4	0	0	0	0	0	0.762	0
PREP1	0.558	0	0	0	0	0	0
PREP2	0.866	0	0	0	0	0	0
PREP3	0.906	0	0	0	0	0	0
PREP4	0.744	0	0	0	0	0	0
PINV1	0	0.818	0	0	0	0	0
PINV2	0	0.889	0	0	0	0	0
PINV3	0	0.807	0	0	0	0	0
PPSS1	0	0	0.8	0	0	0	0
PPSS2	0	0	0.876	0	0	0	0
PPSS3	0	0	0.815	0	0	0	0
FAML1	0	0	0	1	0	0	0
PREP1*PPSS1	0	0	0	0	0.581	0	0
PREP1*PPSS2	0	0	0	0	0.51	0	0
PREP1*PPSS3	0	0	0	0	0.506	0	0
PREP2*PPSS1	0	0	0	0	0.509	0	0
PREP2*PPSS2	0	0	0	0	0.421	0	0
PREP2*PPSS3	0	0	0	0	0.336	0	0
PREP3*PPSS1	0	0	0	0	0.236	0	0
PREP3*PPSS2	0	0	0	0	0.555	0	0
PREP3*PPSS3	0	0	0	0	0.466	0	0
PREP4*PPSS1	0	0	0	0	0.9	0	0
PREP4*PPSS2	0	0	0	0	0.836	0	0
PREP4*PPSS3	0	0	0	0	0.859	0	0