# EBA2911, lecture 16, 20 NOV. 2019, Runar Ile

1. About the exam (technical)
2. How to prepare for the exam
3. Multiple choice spring 2019

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- It is tutoring on Monday 9 Dec in the Study Area from 14 o'clock.
- I will come by at the Study Area Wednesday 4/12 to Friday 6/12 ~ 15 o'clock
- Drop in at the library next Tuesday 15-19.
- You can visit me at my office.

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## 1. About the exam

- 15 problems
- 3 hours (9-12): 12 min/problem
- Multiple choice
- Only one correct answer
- Always possible: 'I choose not to answer this problem' (E)

| | Points |
|---|---|
| Correct answer | 3 |
| Incorrect answer | -1 |
| E | 0 |

- The answer is marked as a cross in the answer sheet on the lines 1-15
- the answer sheet is read by a machine
- Advice: Do not record the answers untill you have finished with checking all your answers (wait untill 15 min before the end)
- Check that you crossed your intended answer.
- Grading the previous years (probably also this year)

Ex

A: 37p (13 correct, 2 wrong)

B: 28p (10 correct, 2 wrong)

C: 18p (6 correct, 0 wrong or 7 correct, 3 wrong)

D: 13p (5 correct, 2 wrong)

E: 9p (3 correct, 0 wrong)

- The problems are not ordered as the curriculum
- The first 6 problems should be central and somewhat basic.

New: No formula sheet !

Tip: Take one of the previous MC exams under realistic conditions!

Note: MC counts for 20 %.

## 2. How to prepare for the exam

1) What is the relevant material?
   - lecture notes
   - tutoring problems

2) When you solve a problem:
   - what is the plan ? (in detail)
   - what kind of knowledge is required (can you tell yourself)
   - what kind of obstacles may occur

3) If you get a wrong answer:
   - what went wrong ?
   - the plan or the execution ?

4) When you have solved a problem:
   - what did I learn

5) Learn the basics well !
   - definitions, concepts

6) The basic problems are the most important ones !

# 3. Multiple Choice 1 spring 2019

Prob 1 : Present value $K_0 = \frac{K_n}{(1+r)^n}$

Prob 2 : A : $f'(x) \overset{\text{prod. r.}}{=} 2x \cdot e^x + x^2 \cdot e^x$

Answer : $x(x+2)e^x = (x^2+2x)e^x$

$= x^2 e^x + 2x e^x$ - ok.

B : $f'(x) \overset{\text{quot. r.}}{=} \frac{\frac{1}{x} \cdot x^2 - \ln(x) \cdot 2x}{(x^2)^2}$

$= \frac{x - \ln(x) \cdot 2x}{x^4} = \frac{x(1 - 2\ln(x))}{x^4} = \frac{1 - 2\ln(x)}{x^3}$

ok.

C : $f(x) = \sqrt{x^2+1} = (x^2+1)^{\frac{1}{2}}$

use the chain rule with

$u = x^2+1$ and $g(u) = u^{\frac{1}{2}}$

$u' = 2x$ and $g'(u) = \frac{1}{2} u^{\frac{1}{2}-1}$

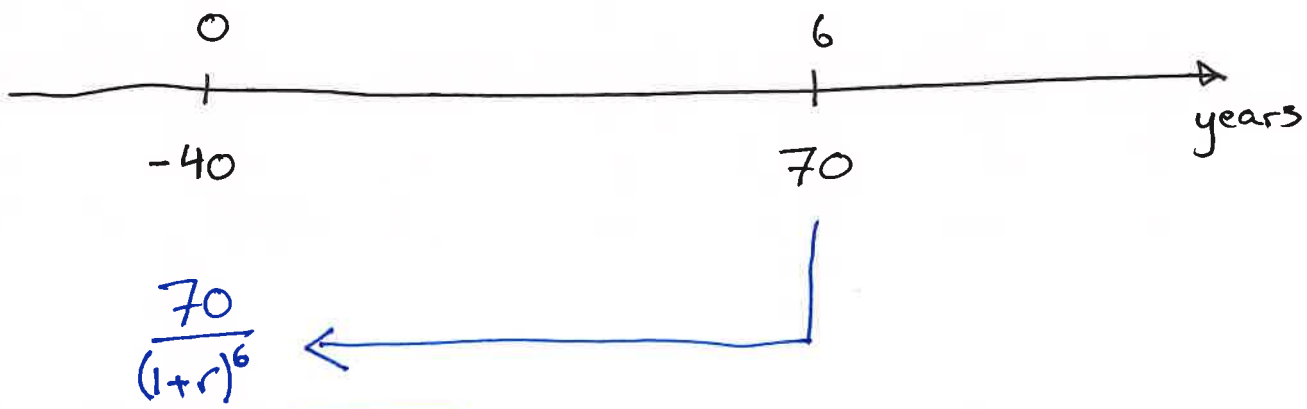
$= \frac{1}{2\sqrt{u}}$

Gives $f'(x) = \frac{1}{2\sqrt{u}} \cdot 2x = \frac{x}{\sqrt{x^2+1}}$ ok.

D : quot. rule !

Prob 3 : $f(x) = e^{-x} = \frac{1}{e^x}$ + knowledge about $e^x$

Prob 4 cash flow, internal rate of return = r




The sum is the present value of the cash flow.

Eq: $-40 + \frac{70}{(1+r)^6} = 0$

Solve:

$$\frac{70}{(1+r)^6} = 40$$

$$70 = 40(1+r)^6$$

$$(1+r)^6 = \frac{70}{40} = \frac{7}{4}$$

$$1+r = \sqrt[6]{\frac{7}{4}} = \left(\frac{7}{4}\right)^{\frac{1}{6}}$$

$$\Rightarrow r = \left(\frac{7}{4}\right)^{\frac{1}{6}} - 1$$

Then calculator !

**Prob 5** Vertical asymptote: $x = 10$

Horizontal —"— : Use poly. div.

and get $f(x) = 4 + \frac{2}{x-10} \xrightarrow[x\to\infty]{} 4$

so left the green.

Alternative: l'Hôpital's rule

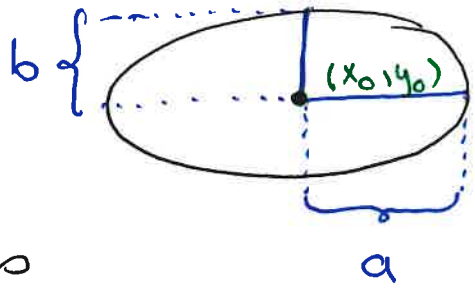
$$\lim_{x\to\infty} \frac{4x-38}{x-10} = \lim_{x\to\infty} \frac{4}{1} = 4$$

$\frac{\infty}{\infty}$

Or: Insert some number (like $x=5$)

**Prob 6** The standard form for the ellipse eq:

$$\frac{(x-x_0)^2}{a^2} + \frac{(y-y_0)^2}{b^2} = 1$$




Centre: $(x_0, y_0)$

half-axes: $a$ and $b$

Centre: $(1, 2)$

half-axes: $4$ and $3$

**Prob 7** Hidden quadratic equation. Put $u=\sqrt{x}$ then $u^2 = x$ and the eq. becomes

$u^2 - 9u - 22 = 0$ & solve $u = \ldots$

then $x = u^2$

Note: $u$ has to be non-negative!

~~$u^2 - 9u - 22 = 0$~~

**Prob 8** A : calculator

B : $1{,}04^{300\,000} = \left((1{,}04)^3\right)^{100\,000}$

$> 1{,}12^{100\,000}$

C : $e^{12\,000} \overset{?}{<} 1{,}12^{100\,000}$

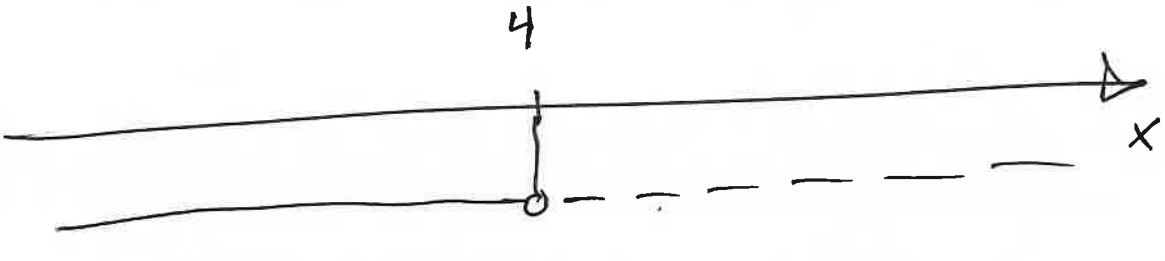
continuous compounding $r = 12\%$

$\ln\left(e^{12\,000}\right) \overset{?}{<} \ln\left(1.12^{100\,000}\right)$

$12\,000 = 12\,000 \cdot \underbrace{\ln(e)}_{1} \overset{?}{<} 100000 \ln(1.12)$

$= 11332{,}87$

**Prob 9**




**Prob 10** Differentiation !