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Problem Set 5

ECON 3213
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Part 1

We see that as they have the same growth / depreciation / savings rates and production function, that they converge to the same steady state behaviour. However, we have that in country B, GDP per capita is much lower, and so we expect them to experience faster initial growth as the further from steady state, the faster the initial growth.

Part 2

In the long run, we see that as measured by GDP per capita, that both grow at rate $g = 0.02$, as predicted by the Solow model in SGU. In the long run, at steady state, we have that they grow at the same rate.

Part 4

We see that country A is already in the steady state and thus all growth comes from technological growth. However, in country B, which starts off far poorer, has most of its growth coming in terms of transitional dynamics rather than technological growth because it is far below the steady state.

Part 3

```
library(xtable)

n = 0.01
g = 0.02
delta = 0.0698
sigma = 0.25
alpha = 0.5

solow <- function(gdp_cap, e, years) {
  gdp_caps <- double(years)
  es <- double(years)
  capital_caps <- double(years)
  growths <- double(years)

  gdp_caps[1] <- gdp_cap
  es[1] <- e
  capital_caps[1] <- ((gdp_cap) / (e ^ (1 - alpha))) ^ (1 / alpha)

  for (year in 2:years) {
    es[year] <- es[year - 1] * (1 + g)
    capital_caps[year] <- (capital_caps[year - 1] * (1 - delta) +
                           gdp_caps[year - 1] * sigma) / (1 + n)
    gdp_caps[year] <- (capital_caps[year] ^ alpha) * (es[year] ^ (1 - alpha))
    growths[year] <- (gdp_caps[year] / gdp_cap) ^ (1/(year - 1))
  }

  tech <- (log(es) - log(e)) / (log(gdp_caps) - log(gdp_cap))

  return (list(gdp=gdp_caps, tech=tech, growth=growths))
}

A <- solow(2.5, 1, 26)
B <- solow(0.25, 1, 26)

part_three <- data.frame(A$gdp, A$growth, A$tech, B$gdp, B$growth, B$tech)

colnames(part_three) <- c("A GDP/Capita", "A % growth", "A % from tech",
                          "B GDP/Capita", "B % growth", "B % from tech")

xtable(part_three, type="latex")
```

Growth is given in the form: if each entry is g, then $Y_1/L_1 \cdot g^{T-1} = Y_T/L_T$

	A Y_t/L_t	A growth	A % from tech	B Y_t/L_t	B growth	B % from tech
1	2.50	0.00		0.25	0.00	
2	2.55	1.02	100	0.35	1.40	6
3	2.60	1.02	100	0.45	1.34	7
4	2.65	1.02	100	0.56	1.31	7
5	2.71	1.02	100	0.66	1.28	8
6	2.76	1.02	100	0.77	1.25	9
7	2.82	1.02	100	0.88	1.23	9
8	2.87	1.02	100	0.99	1.22	10
9	2.93	1.02	100	1.10	1.20	11
10	2.99	1.02	100	1.21	1.19	11
11	3.05	1.02	100	1.32	1.18	12
12	3.11	1.02	100	1.43	1.17	13
13	3.17	1.02	100	1.54	1.16	13
14	3.23	1.02	100	1.65	1.16	14
15	3.30	1.02	100	1.76	1.15	14
16	3.36	1.02	100	1.87	1.14	15
17	3.43	1.02	100	1.98	1.14	15
18	3.50	1.02	100	2.09	1.13	16
19	3.57	1.02	100	2.20	1.13	16
20	3.64	1.02	100	2.31	1.12	17
21	3.71	1.02	100	2.42	1.12	17
22	3.79	1.02	100	2.53	1.12	18
23	3.86	1.02	100	2.64	1.11	18
24	3.94	1.02	100	2.76	1.11	19
25	4.02	1.02	100	2.87	1.11	19
26	4.10	1.02	100	2.98	1.10	20