Question 1b

Stock price (S):	\$40
Strike price (K):	\$45
Time (t):	4 months; 4/12 = 0.33
Risk-free rate (r):	3%/year; 3/100 = 0.03
Mean return:	7%/year
Standard deviation (σ):	40%/year; 40/100 = 0.4
Call-price (C):	?

Black-Scholes call option pricing formula:

$$C = S_t N(d_1) - Ke^{-rt} N(d_2) \qquad \textit{Equation I}$$

Where,

$$d_1 = \frac{\log_e \frac{S}{K} + (r + \frac{\sigma^2}{2})t}{\sigma\sqrt{t}} \qquad \textit{Equation II}$$

$$d_2 = d_1 - \sigma\sqrt{t} \qquad \textit{Equation III}$$

$$d_1 = \frac{\log_e \frac{40}{45} + (0.03 + \frac{0.4^2}{2})0.3333}{0.4\sqrt{0.33}}$$

$$d_1 = \frac{-0.1177 + 0.0366}{0.2309}$$

$$d_1 = \frac{-0.0811}{0.2309}$$

Therefore, $d_1 = -0.3512$

and, $d_2 = -0.3512 - 0.4\sqrt{0.3333}$

$$d_2 = -0.3512 - 0.2309$$

$$d_2 = -0.5821$$

$d_1 = -0.3512$ and $d_2 = -0.5821$

From the Normal Distribution Table,
$N(d_1) = 0.3627$
$N(d_2) = 0.2802$

Recall Black-Scholes call price formula from equation (i)

$$C = 40(0.3627) - 45e^{-0.03*0.3333}(0.2802)$$

$$C = 14.508 - 44.5522(0.2802)$$

$$C = 14.508 - 12.4835$$

$$C = 2.0245$$

Therefore, the call price is approximately **2.02**