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SOLUTION

Black-Scholes Call Price (C), for Yara Inc,

$$C = SN(x_1) - BN(x_2)$$

Where $x_1 = \frac{\text{Log}(S/B)}{\sigma\sqrt{T}} + \frac{1}{2}\sigma\sqrt{T}$

$$x_2 = \frac{\text{Log}(S/B)}{\sigma\sqrt{T}} - \frac{1}{2}\sigma\sqrt{T}$$

Calculating for x_1,

S = stock price = \$40

$B = ke^{-rt}$, where k = Strike price = \$45

r = risk free interest rate = 3% p.a

t = Time of maturity = 4 months = $4/12$

$$x_1 = \frac{\text{Log}(40/45\exp(-0.3(1/3)))}{0.4\sqrt{1/3}} + \frac{1}{2} \times 0.4\sqrt{1/3}$$

$$x_1 = \frac{\text{Log}(40/44.55)}{0.4\sqrt{1/3}} + \frac{1}{2} \times 0.4\sqrt{1/3}$$

$$x_1 \simeq -0.3512442$$

Calculating for x_2,

$$x_2 = \frac{\text{Log}(40/45e^{-0.3(1/3)})}{0.4\sqrt{1/3}} + \frac{1}{2} \times 0.4\sqrt{1/3}$$

$$x_2 \simeq -0.5822$$

$$N(x_1) = N(-0.3512442) = 0.3627026$$
$$N(x_2) = N(-0.5821843) = 0.2802213$$

(HB: N = A normal distribution)

Calculating for Black-Scholes price for Yara Inc.,

$$C = SN(x_1) - BN(x_2)$$
$$C = (40 \times 0.3627026) - (45e^{-0.3(1/3)} \times 0.2802213)$$
$$C = (40 \times 0.3627026 - 44.5524 \times 0.2802213$$

$$C \simeq 2.023617$$

ie Black-scholes price for Yara Inc. = $2.0