

23. Consider a European call option on a nondividend-paying stock with exercise date T , $T > 0$. Let $S(t)$ be the price of one share of the stock at time t , $t \geq 0$. For $0 \leq t \leq T$, let $C(s, t)$ be the price of one unit of the call option at time t , if the stock price is s at that time. You are given:

(i) $\frac{dS(t)}{S(t)} = 0.1dt + \sigma dZ(t)$, where σ is a positive constant and $\{Z(t)\}$ is a Brownian motion.

(ii) $\frac{dC(S(t), t)}{C(S(t), t)} = \gamma(S(t), t)dt + \sigma_C(S(t), t)dZ(t)$, $0 \leq t \leq T$

(iii) $C(S(0), 0) = 6$.

(iv) At time $t = 0$, the cost of shares required to delta-hedge one unit of the call option is 9.

(v) The continuously compounded risk-free interest rate is 4%.

Determine $\gamma(S(0), 0)$.

(A) 0.10

(B) 0.12

(C) 0.13

(D) 0.15

(E) 0.16