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M339 D: November 27th, 2023.
 focus on the Delta.
 value f'ion: v(s,t,r,σ)
 Example. Outright Purchase of a Non-Dividend Paying Stock.
               stands for the time t stock price
Example. European Call
      v(s,t) = s N(d,(0t)) - Ke-r(T-t) N(d,(0t))
       d_{1} \frac{1}{\sigma \sqrt{1-t'}} \left[ \ln \left( \frac{3}{K} \right) + (r + \frac{\sigma^{2}}{2}) \left( T-t \right) \right]
       and d2 = d1 - 0/T-t
     By defin: \Delta_c(s,t) = \frac{\partial}{\partial s} v_c(s,t)
      After the chain rule and product rule
                De (s,t) = N(d, (s,t)) > 0
        The positivity makes sense since the call is
               long w.r.t. the underlying.
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Example. European Put.

Rd. Call Parity

$$\frac{\partial \Delta}{\partial t} / \Delta_{c}(t,t) - \Delta_{p}(t,t) = 1$$

$$\Delta_{p}(s,t) = \Delta_{c}(s,t)-1 = N(d_{1}(s,t))-1 = -N(-d_{1}(s,t)) < 0$$

- (A) 7.32 million
- (B) 7.42 million
- (C) 7.52 million
- (D) 7.62 million
- (E) 7.72 million
- 8. You are considering the purchase of a 3-month 41.5-strike American call option on a nondividend-paying stock.

You are given:

- (i) The Black-Scholes framework holds.
- (ii) The stock is currently selling for 40.
- (iii) The stock's volatility is 30%.
- (iv) The current call option delta is 0.5.

Determine the current price of the option.

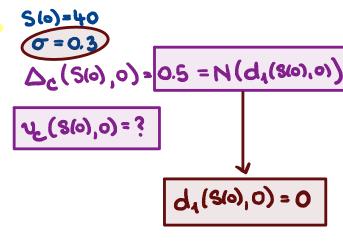
(A)
$$20 - 20.453 \int_{-\infty}^{0.15} e^{-x^2/2} dx$$

(B)
$$20 - 16.138 \int_{-\infty}^{0.15} e^{-x^2/2} dx$$

(C)
$$20 - 40.453$$
 $\int_{-\infty}^{0.15} x^2/2 dx$

(D)
$$16.13$$
 $\int_{-\infty}^{0.15} e^{-x^2/2} dx - 20.453$

(E)
$$40.45 \int_{-\infty}^{0.15} e^{-x^2/2} dx - 20.453$$



$$d_{2}(S(0), 0) = d_{4}(S(0), 0) - \sigma \sqrt{T}$$

$$= 0 - 0.3 \cdot 0.25$$

$$d_{2}(S(0), 0) = -0.45$$