

51. Find the stock price on the exercise date for a European put with strike price \$36 and exercise date in three months to produce a profit of \$2 if the option is bought for \$4.50 and financed by a loan at 12% (cc).
52. For a European call on a non-dividend-paying stock, find the bounds on the call price when the stock price is 51, the expiry time is 2 years, the strike price is 50, and the interest rate is 10%.
53. For a European put on a non-dividend-paying stock, find the bounds on the put price when the stock price is 50, the expiry time is 2 years, the strike price is 51, and the interest rate is 10%.
54. A 1-month European put on a non-dividend-paying stock is currently selling for \$2.50. The stock price is \$47, the strike price is \$50, and  $r$  is 6%. What opportunities are there for an arbitrageur?
55. The price of a non-dividend-paying stock is \$19 and the price of a 3-month European put on the stock with a strike price of \$20 is \$1. If  $r$  is 4%, what is the price of a 3-month European call with a strike price of \$20?
56. Suppose that a stock paying no dividends is trading at \$15.60 a share. European calls on the stock with strike price \$15 and exercise date in three months are trading at \$2.83. The interest rate is 6.72%, compounded continuously. What is the price of a European put with the same strike price and exercise date?
57. European call and put options with strike price \$24 and exercise date in six months are trading at \$5.09 and \$7.78. The price of the underlying stock is \$20.37 and the interest rate is 7.48%. Find an arbitrage opportunity.
58. The price of an American call on a non-dividend-paying stock is \$4. The stock price is \$31, the strike price is \$30, the expiration date is in 3 months, and  $r$  is 8%. Derive upper and lower bounds for the price of an American put on the same stock with the same strike price and expiration date.