Finance 5360 Quiz B: 8/6/15 Name Key

Summer Heat Inc. is considering building a new plant at a cost of $100 million. The facility would generate its first net cash flow of $27 million one year from today. In subsequent years, net cash flows would grow by 5% per year through the plant's closing 20 years from today. If sales fall short of expectations, the facility can be sold three years from today for $55 million. If sales from the new plant exceed expectations, it can be expanded at a cost of $50 million four years from today. The expansion would be expected to generate its first cash flow of $10 million five years from today. Subsequent cash flows would grow by 1% per year through the plant's closing 20 years from today. The standard deviation of returns on the new facility will equal 25% over its life, 34% over the next three years, and 29% over the next four years. The standard deviation of returns on the expansion will equal 45% over the next three years, 48% over the next four years, and 50% once in place. The cost of capital on the new plant is 12% and on the expansion is 15%. Finally, the risk-free interest rate varies by maturity as follows: 1-year = 0.5%; 2-year = 0.9%; 3-year = 1.2%; 4-year = 1.5%; 5-year = 1.9%; 10-year = 2.8%; 20-year = 3.5%.

How does the possibility of expanding the new plant if sales exceed expectations affect the value of the new plant to Summer Heat?

+5 $C = S(N(d_1)) - PV(K)(N(d_2))$

+5 $S = \left(\frac{10}{.15-.01}\right)\left(1-\left(\frac{1.01}{1.15}\right)^{16}\right)\left(\frac{1}{1.15}\right)^{4}$ (+2 +2 +2 +2 +2)

+5 $d_1 = \frac{\ln\left(\frac{S}{PV(K)}\right)}{\sigma\sqrt{T}} + \frac{\sigma\sqrt{T}}{2}$

+5 $d_2 = d_1 - \sigma\sqrt{T}$

+5 $PV(K) = \frac{50}{(1.015)^4}$ (+10 +5 +10)

$\sigma = .48$ +10

$T = 4$ +5

Look up $N(d_1)$ + $N(d_2)$ on table or calculate using Excel