Your boss has asked you to determine how being able to expand a proposed facility will affect the value of the facility. Set up the calculations needed to provide her with an answer.

**Information on the facility:**
- Cost to build facility = $105 million
- Present value today of the facility’s cash flows: first three years = $30 million; first four years = $75 million; all seven years = $135 million
- Life of factory = seven years
- Proceeds if sell factory at any time over the next four years = $45 million
- Standard deviation of returns on factory: first year = 30%; first three years = 35%; first four years = 38%; all seven years = 40%

**Information on possible expansion of the facility:**
- Cost to expand at any time over the next three years = $30 million
- Present value of expansion’s cash flows: PV at the time of expansion = $28.5 million; PV today = $24 million
- Life of expansion = seven years (once built)
- Standard deviation of returns on expansion: over next three years = 45%; over next ten years = 50%

**Returns on U.S. Treasuries:**
- 1-year = 1.5%; 2-year = 2%; 3-year = 2.5%; 4-year = 3%; 5-year = 3.5%; 7-year = 4%; 8-year = 5%; 10-year = 5.5%

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\begin{align*}
\text{16} & : C = 24(N(d_1)) - PV(K)N(d_2) \\
\text{21} & : d_1 = \frac{24}{45 + 1.3} + \frac{45 + 5}{2} \\
\text{31} & : PV(K) = \frac{30}{(1.025)^3} + 5 \\
\text{6} & : d_2 = d_1 - 0.4513 \\
\text{1} & : \text{look up } N(\cdot) \text{ using Excel or tables}
\end{align*}
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