Session 23: Post class test solutions

1. **e. All of the above.** For equity to be viewed as a call option, equity investors have to be running the firm, have a residual claim on the assets in liquidation and have limited liability.

2. **Inputs to the option pricing model**
   a. \( S = 1000 = 80/(.10-.02) \)
   b. \( K = 1500 = \) Face value of the zero coupon bond
   c. \( r = 3\% \)
   d. \( t = 8 \) years
   e. \( \sigma = 45\% = \) Standard deviation of chemical firm values
   f. \( y (\text{Cost of delay}) = 0 \) (If the company had a contractual commitment to make cash flows every year, you could have used that cash flow to get your dividend yield)

3. **c. 12.91\%.** Plugging in the values of \( N(d1) \) and \( N(d2) \) into the equation, we get:
   - Value of equity = \( 1000 (.6937) + 1500 \exp^{1.03(8)}(.2217) = 432.09 \)
   - Value of zero coupon bond = \( 1000 - 432.09 = 567.91 \)
   - Interest rate on zero coupon bond = \( (1000/567.91)^{1/8}.1 = .1291 \)

4. **f. 77.83\%.** It is \( N(d2) \) that gives you the risk neutral probability that this option will be in the money (will have asset value > face value of debt). Therefore the probability that it will not have enough to cover its debt = \( 1-.2217 = .7783 \)

5. **b. A company in a risky business with predominantly long term debt.** The value of equity as an option increases with uncertainty (risky business) and with the option maturity (long term debt).