

### 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.  $y$  (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 =  $1000 (.6937) + 1500 \exp^{-(.03)(8)} (.2217) = \$432.09$
  - 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).