1) Sell call option at strike of 27.50, and buy strike at 25. You don't pay appreciation above 28, but collect any appreciation between 26 and 27.5

2) a) $0.5C(40) + 0.5C(55) > C(50)$

$C(20) + C(27.5) > C(50)$

$C(45) > C(50)$

Valid

b) $(\frac{1}{3})C(40) + (\frac{2}{3})C(55) > C(50)$

$C(50) = C(50)$

Valid

c) $(\frac{2}{3})C(40) + (\frac{1}{3})C(55) > C(50)$

$C(45) > C(50)$

Valid

d) $0.5P(40) + 0.5P(55) > P(50)$

$P(47.5) > P(50)$

invalid

e) $(\frac{1}{3})P(40) + (\frac{2}{3})P(55) > P(50)$

$P(50) = P(50)$

Valid

f) $(\frac{2}{3})P(40) + (\frac{1}{3})P(55) > P(50)$

$P(45) > P(50)$

Invalid

3) $S = 50 \quad r = 0.1$

$F = Se^{rT}$

$= 50e^{0.1 \cdot (\frac{6}{12})}$

$= 52.56$

Short the call option, go long for put option

Borrow money to purchase the stock at the given interest rate

If $S_T < 52.56$, the call option is worthless, but the put option pays $52.56 - S_T$

If $S_T > F$, the call option is exercised, but the put option is worthless. The investor can sell the stock to repay the borrowed amount

4) Butterfly spread combines bull and bear spreads with a fixed risk and capped profit, using 4 calls, 4 puts or a combination. If you sell a butterfly spread, the maximum profit if higher k - k of sold put option.