

HW #8

1. $x_1 + 3x_1 x_2 = 6x_2^2 + 8$
 $\Phi(x) + b = x_1 + 3x_1 x_2 - 6x_2^2 - 8 = 0$
 $w = (1, 0, 0, -6, \frac{3}{2})$

$2ad=4$ $2d + \binom{d}{2}$ $\dim(\Phi(x))$
 $2(4) + \binom{4}{2} = 14$

b. $\dim(w) = 14$

3. a. Yes, because the dataset is linearly separable
 b. No, as long as quadratic terms contribute to classification / decision boundary is quadratic

4. a. $\alpha = (0, 2, 2, 1)$
 b. $b = -1$

5. a. $\dim(\alpha) = 36$, # of training pts
 b. 6 entries, # of support vectors
 c. None, α is bounded by 0 and C,
 $0 \leq \alpha_i \leq C$
 d. The margin on the green side is larger because there are more support vectors on the green side than the purple side