1. (b)

$$\begin{aligned} 2Me^{-2\epsilon^2 N} &\le \delta \\ -2\epsilon^2 N &\le \ln \frac{\delta}{2M} \\ N &\ge \frac{1}{2\epsilon^2} \ln \frac{2M}{\delta} \end{aligned}$$

   For $\epsilon = 0.05$, $M = 1$, and $\delta = 0.03$, we get $N \ge 840$.

2. (c) Plug in $M = 10$ instead and we get $N \ge 1300$.

3. (d) Plug in $M = 100$ and we get $N \ge 1761$.

4. (b) Break point for perceptron is $n+2$ where n is the number of dimensions. So this time we get 5.

5. (b) The growth function is either polynomial in N or 2^N.

6. (c) h can only shatter 4 points because we can only have 4 sign switches while allowing for the smallest point to be positive. So the smallest break point is 5.

7. (c) We count the number of "switches" from negative points to positive points and from positive points to negative points. We can have 0 to 4 switch points, so the growth function is (using Pascal's rule)

$$\begin{aligned} m_{\mathcal{H}} &= \binom{N}{0} + \binom{N}{1} + \binom{N}{2} + \binom{N}{3} + \binom{N}{4} \\ &= 1 + \binom{N+1}{2} + \binom{N+1}{4} \end{aligned}$$

8. (d) We need to find N where

$$\sum_{k=0}^{2M} \binom{N}{k} < 2^N.$$

   I just let $M = 12$ and on a computer found that the smallest such N is $N = 25$. So our break point is $2M + 1$.

9. (d) Just draw a regular polygon of N sides and think through it.

10. (b) Perform a transformation and order the points by

$$(x, y) \to r \equiv \sqrt{x^2 + y^2}.$$

   This is equivalent to the interval problem where given an interval, a point is $+1$ if it's in the interval and -1 otherwise. This gives

$$m_{\mathcal{H}} = \sum_{k=0}^{2} \binom{N}{k} = 1 + \binom{N+1}{2}.$$