

# EXAM P QUESTIONS OF THE WEEK

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## Week of April 16/07

If  $X$  has a normal distribution with mean 1 and variance 4, then  $P[X^2 - 4X \leq 0] = ?$

- A) Less than .15      B) At least .15 but less than .35  
C) At least .35 but less than .55      D) At least .55 but less than .75  
E) At least .75

**The solution can be found below.**

## **Week of April 16/07 - Solution**

Since  $X \sim N(1, 4)$ ,  $Z = \frac{X-1}{2}$  has a standard normal distribution. The probability in question can be written as

$$\begin{aligned} P[X^2 - 4X \leq 0] &= P[X^2 - 4X + 4 \leq 4] = P[(X - 2)^2 \leq 4] = P[-2 \leq X - 2 \leq 2] \\ &= P[-1 \leq X - 1 \leq 3] \\ &= P[-.5 \leq \frac{X-1}{2} \leq 1.5] = P[-.5 \leq Z \leq 1.5] = \Phi(1.5) - [1 - \Phi(.5)] \\ &= .9332 - .3085 = .6247. \quad (\text{from the standard normal table}). \quad \text{Answer: D} \end{aligned}$$