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Computing with the normal distribution: problems

Problem 1

After mowing, blades of grass in a yard have lengths which are normally-distributed with mean 3" and standard deviation 0.4".

(a) Sketch the distribution. Label at least 5 points on the x-axis.

(b) Fill in the blank: About 68% of all blades of grass have length between _____ and _____.

(c) Fill in the blank: About 95% of all blades of grass have length between _____ and _____.

(d) Fill in the blank: About 99.7% of all blades of grass have length between _____ and _____.

Problem 1

(a) $X \sim N(3.0, 0.4^2)$.

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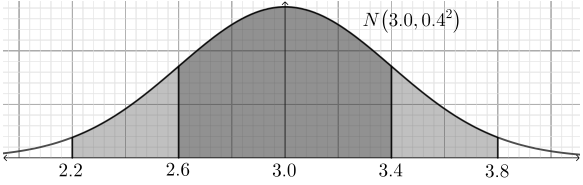

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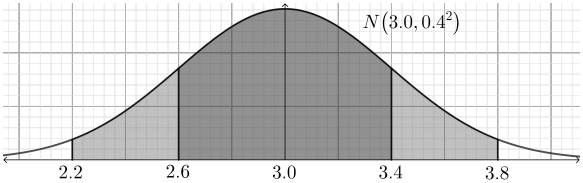

(b) About 68% of all blades of grass have length between 2.6 and 3.4.

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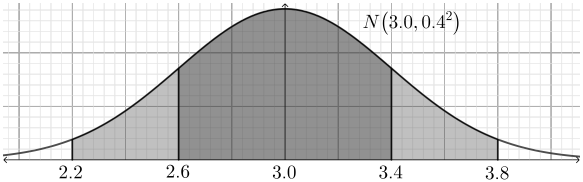

(b) About 68% of all blades of grass have length between 2.6 and 3.4.

(c) About 95% of all blades of grass have length between 2.2 and 3.8.

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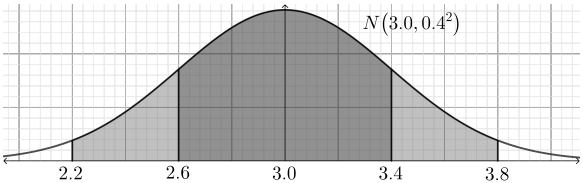
(a) $X \sim N(3.0, 0.4^2)$.



(b) About 68% of all blades of grass have length between 2.6 and 3.4.

(c) About 95% of all blades of grass have length between 2.2 and 3.8.

(d) About 99.7% of all blades of grass have length between 1.8 and 4.2.

Problem 2

After mowing, blades of grass in a yard have lengths which are normally-distributed with mean 3" and standard deviation 0.4". Let X represent the length of a single randomly-selected blade. Compute the following probabilities.

(a) $P(X < 3.5)$

(b) $P(X > 2.5)$

(c) $P(3.1 \leq X \leq 3.8)$

(d) $P(3.8 \leq X \leq 4.1)$

Problem 2

$X \sim N(3.0, 0.4^2)$.

(a) $P(X < 3.5)$

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(a) $P(X < 3.5) = \texttt{pnorm}(3.5, 3, .4)$

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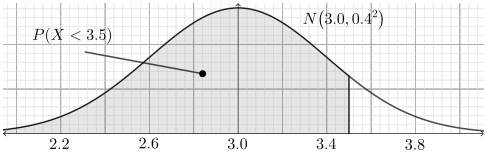
(a) $P(X < 3.5) = \texttt{pnorm}(3.5, 3, .4) = 0.894$



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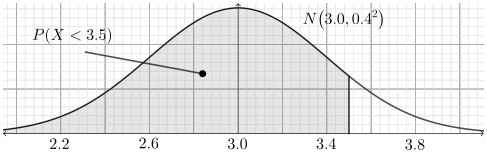

(b) $P(X > 2.5)$

Problem 2

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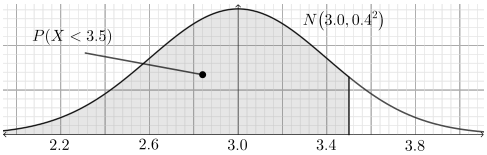

(b) $P(X > 2.5) = 1 - \texttt{pnorm}(2.5, 3, .4)$

Problem 2

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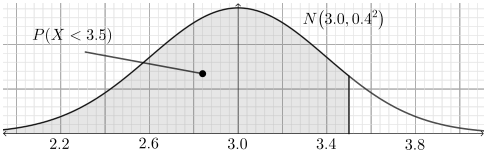

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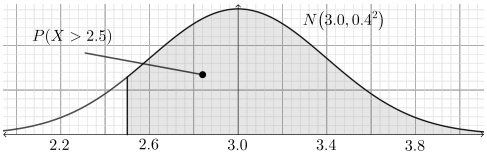

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$X \sim N(3.0, 0.4^2)$.

(c) $P(3.1 \leq X \leq 3.8)$

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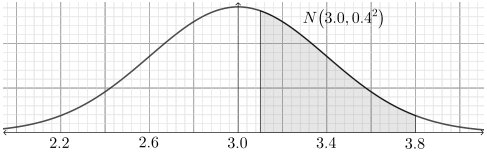
(c) $P(3.1 \leq X \leq 3.8) = \texttt{pnorm}(3.8, 3, .4) - \texttt{pnorm}(3.1, 3, .4)$

Problem 2

$X \sim N(3.0, 0.4^2)$.

(c) $P(3.1 \leq X \leq 3.8) = \texttt{pnorm}(3.8, 3, .4) - \texttt{pnorm}(3.1, 3, .4) = 0.379$



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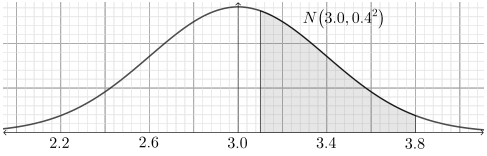

(d) $P(3.8 \leq X \leq 4.1)$

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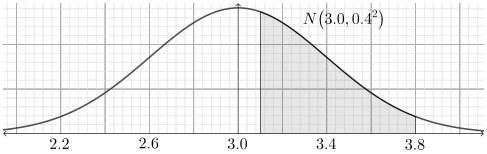

(d) $P(3.8 \leq X \leq 4.1) = \texttt{pnorm}(4.1, 3, .4) - \texttt{pnorm}(3.8, 3, .4)$

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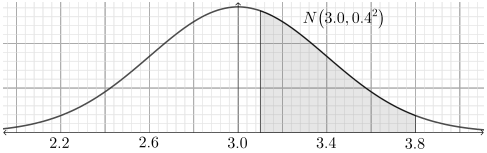

(d) $P(3.8 \leq X \leq 4.1) = \texttt{pnorm}(4.1, 3, .4) - \texttt{pnorm}(3.8, 3, .4) = 0.020$