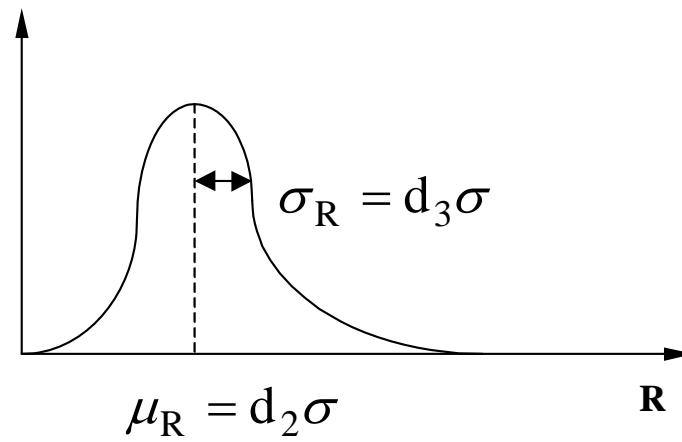


# Gráficos de Controle para Variáveis

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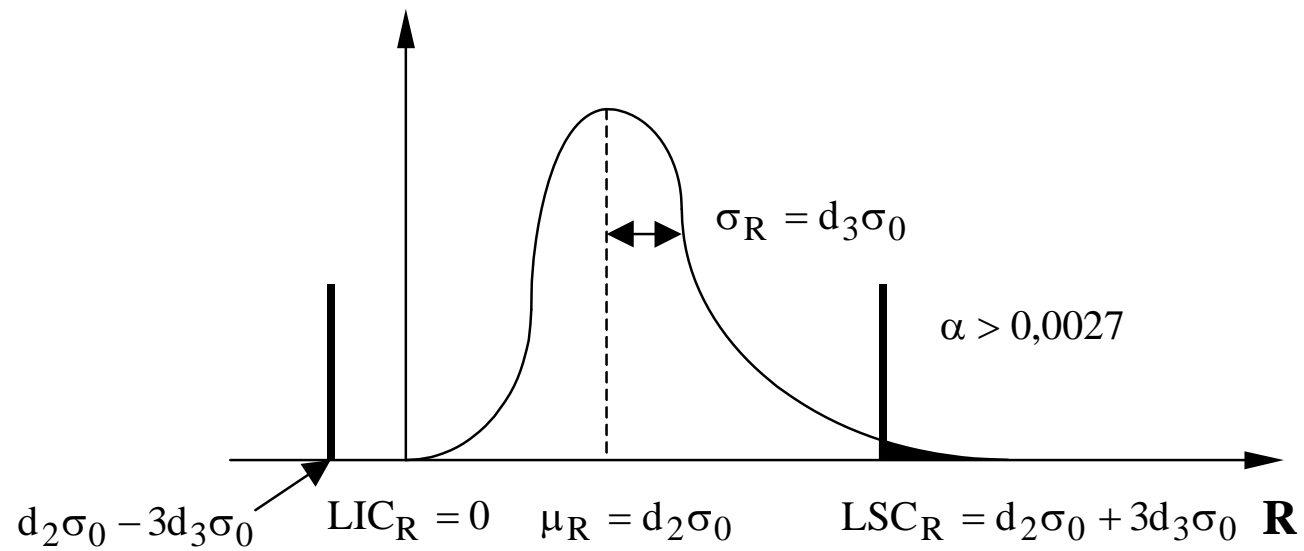
19/08/2013



**Figura 1: Distribuição da amplitude  $R$**

$$\mathbf{H}_0 : \sigma = \sigma_0$$

$$\mathbf{H}_1 : \sigma \neq \sigma_0$$

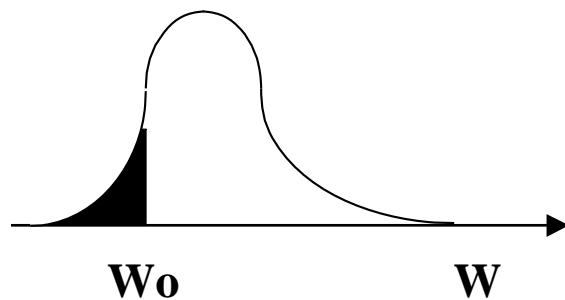


**Figura 2: Distribuição da Amplitude R- limites de 3 sigma**

## Gráfico de Controle de R- Risco $\alpha$

Tabela B: Distribuição Acumulada da Amplitude Relativa W

A tabela fornece  $\Pr[W < W_0]$



$$1 - \alpha = \Pr[R < (d_2 + 3d_3)\sigma_0 = 4,70\sigma_0]$$

$$LSC_R = W_{0,995}\hat{\sigma}_0$$

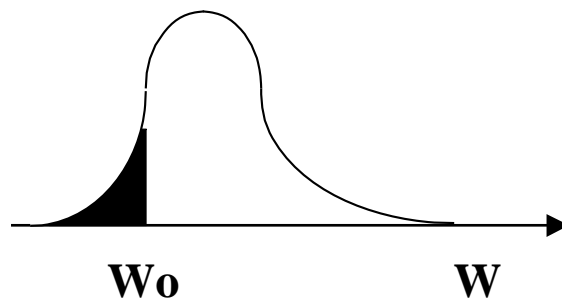
$$LSC_R = 4,70\hat{\sigma}_0$$

W <sub>0</sub>	n				
	2	3	4	5	6
4,50	0,9985	0,9958	0,9920	0,9873	0,9817
4,55	0,9987	0,9963	0,9929	0,9887	0,9837
4,60	0,9989	0,9967	0,9937	0,9899	0,9855
4,65	0,9990	0,9971	0,9944	0,9911	0,9871
<b>4,70</b>	0,9991	0,9974	<b>0,9951</b>	0,9921	0,9885
4,75	0,9992	0,9977	0,9956	0,9930	0,9898
4,80	0,9993	0,9980	0,9962	0,9938	0,9910
4,85	0,9994	0,9982	0,9966	0,9945	0,9920
4,90	0,9995	0,9985	0,9970	0,9952	0,9930
4,95	0,9995	0,9986	0,9974	0,9958	0,9938

## Gráfico de Controle de R- Risco $\alpha$

Tabela B: Distribuição Acumulada da Amplitude Relativa W

A tabela fornece  $\Pr[W < W_0]$



$$LSC_R = w_{0,999} \hat{\sigma}_0 \quad (3.68)$$

$$LSC_R = 5,30 \hat{\sigma}_0 \quad (3.70)$$

$W_0$	n				
	2	3	4	5	6
4,50	0,9985	0,9958	0,9920	0,9873	0,9817
4,55	0,9987	0,9963	0,9929	0,9887	0,9837
4,60	0,9989	0,9967	0,9937	0,9899	0,9855
4,65	0,9990	0,9971	0,9944	0,9911	0,9871
<b>4,70</b>	0,9991	0,9974	<b><u>0,9951</u></b>	0,9921	0,9885
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4,80	0,9993	0,9980	0,9962	0,9938	0,9910
4,85	0,9994	0,9982	0,9966	0,9945	0,9920
4,90	0,9995	0,9985	0,9970	0,9952	0,9930
4,95	0,9995	0,9986	0,9974	0,9958	0,9938
5,00	0,9996	0,9988	0,9977	0,9963	0,9945
5,05	0,9996	0,9990	0,9980	0,9967	0,9952
5,10	0,9997	0,9991	0,9982	0,9971	0,9958
5,15	0,9997	0,9992	0,9985	0,9975	0,9963
5,20	0,9998	0,9993	0,9987	0,9978	0,9968
5,25	0,9998	0,9994	0,9988	0,9981	0,9972
<b>5,30</b>	0,9998	0,9995	<b><u>0,9990</u></b>	0,9983	0,9975
5,35	0,9998	0,9995	0,9991	0,9985	0,9979
5,40	0,9999	0,9996	0,9992	0,9987	0,9981
5,45	0,9999	0,9997	0,9993	0,9989	0,9984
5,50	0,9999	0,9997	0,9994	0,9990	0,9986

## Gráfico de Controle de R- Poder Pd

$$Pd = Pr[R > LSC_R = (d_2 + 3d_3)\sigma_0 \mid \sigma = 2\sigma_0] =$$

$$Pr\left[W = \frac{R}{\sigma} > \frac{(d_2 + 3d_3)\sigma_0}{\sigma} \mid \sigma = 2\sigma_0\right] = Pr\left[W > \frac{d_2 + 3d_3}{2}\right] \quad (3.65)$$

$$Pd = Pr\left[W > \frac{d_2 + 3d_3}{2} = \frac{4,92}{2} = 2,46 \mid n = 5\right] = 1 - 0,59 = 0,41 \quad (3.66)$$

	<b>n</b>			
<b>W<sub>0</sub></b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
2,40	0,6748	0,5643	0,4663	0,3820
<b>2,45</b>	0,6932	<b>0,5861</b>	0,4899	0,4059
2,50	0,7110	0,6075	0,5132	0,4300

## Gráfico de Controle de R- Poder Pd

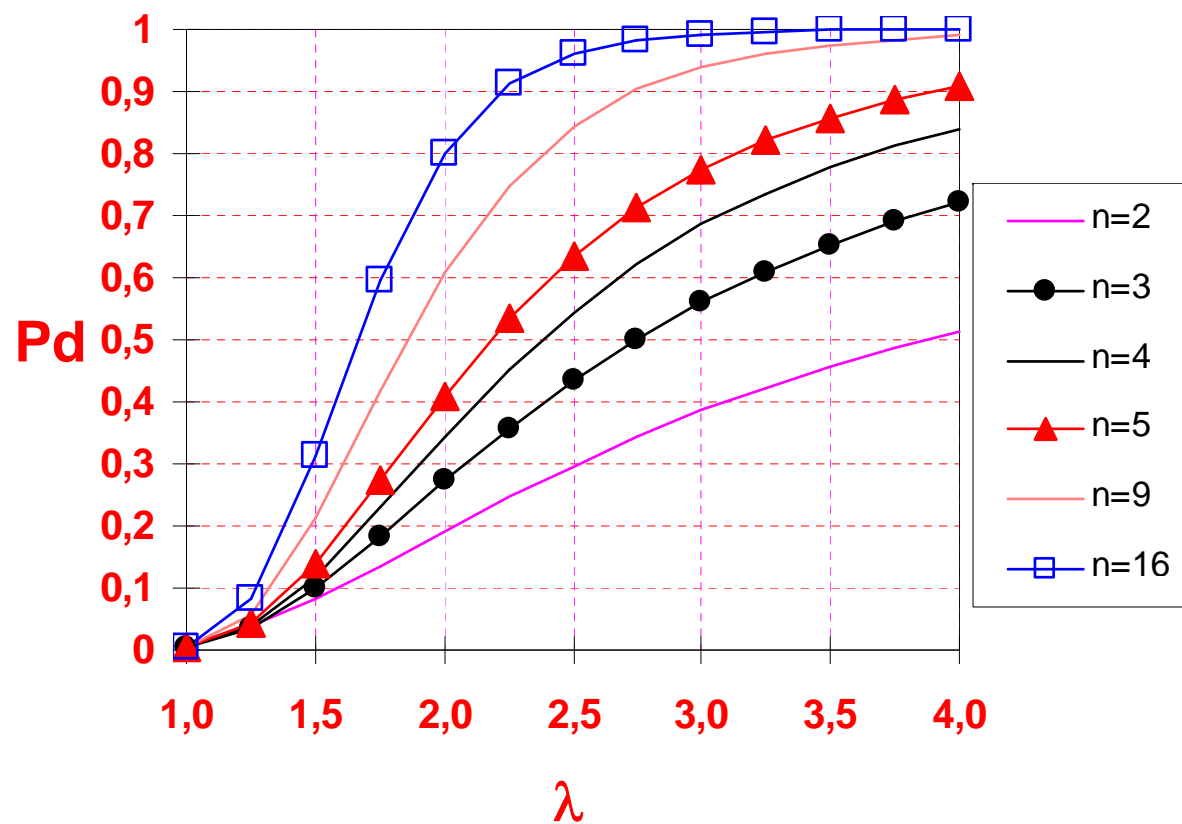


Figura 4: Curvas do Poder Pd versus  $\lambda$

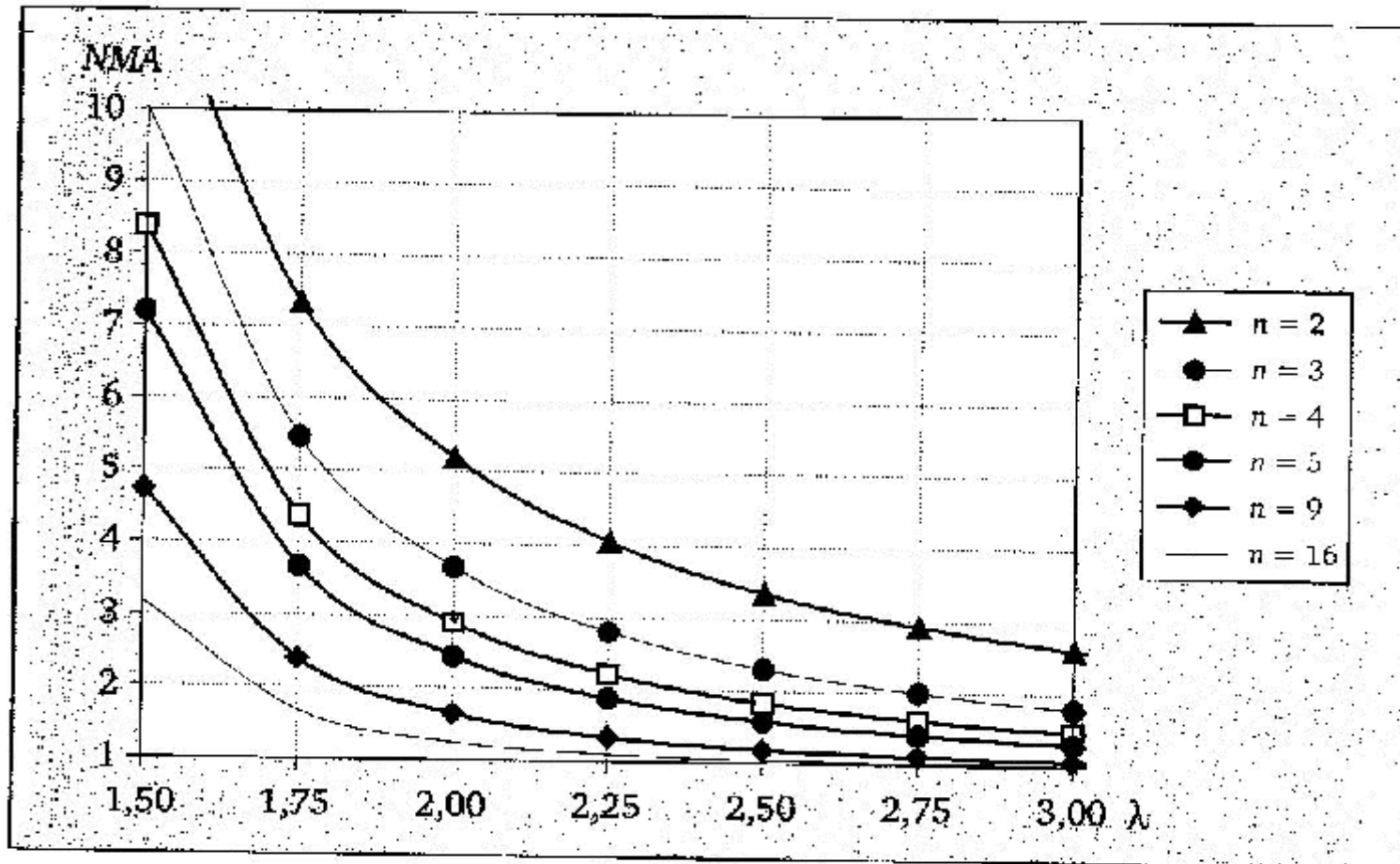


Figura 3.19 *Curvas de NMA versus  $\lambda$ .*