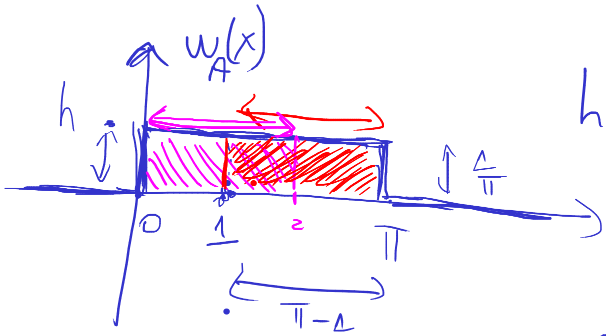
$\boxed{\text{Total Area} = 1}$

Seminar 1

(1)



$h = \frac{1}{\pi}$

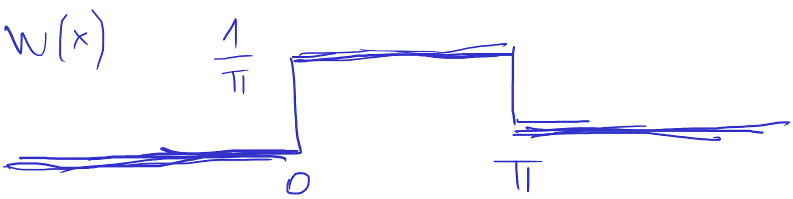
b). $P(A > 1) = \int_1^{\infty} w_A(x)\,dx = \frac{(\pi - 1)}{\pi} \cdot = 0.68$

$A \in (1, \infty)$

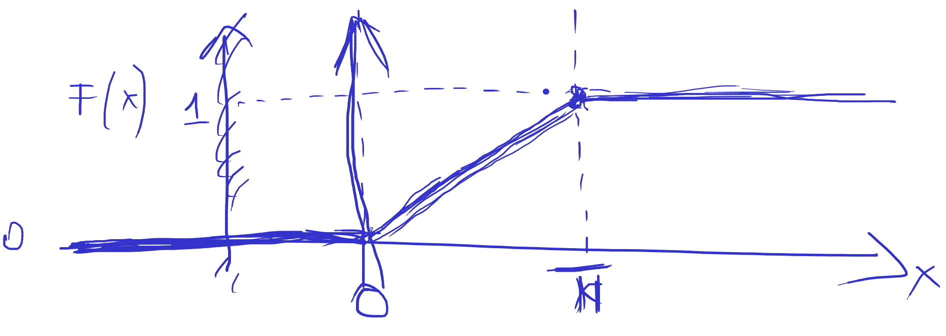
c). $P(A \in (0,2)) = \int_0^2 w_A(x)\,dx = \int_0^2 \frac{1}{\pi}\,dx$

$= \frac{1}{\pi} \cdot x \Big|_0^2 = \frac{1}{\pi}(2-0) = \frac{2}{\pi}$

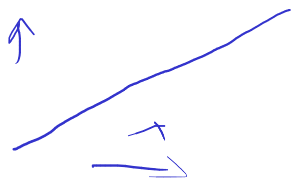
d). $CDF(x) = \int PDF(x) =$ "F. de rep." (rom.) $= F(x)$



$\int \frac{1}{\pi}\,dx = \frac{1}{\pi} x$

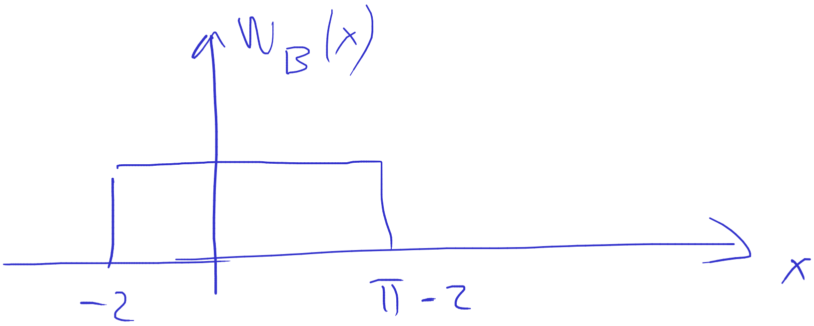


1



$F(x) = \begin{cases} 0, & x \le 0 \\ \frac{1}{\pi} \cdot x, & x \in (0, \pi) \\ 1, & x \ge \pi \end{cases}$

e) $B = A - 2$?



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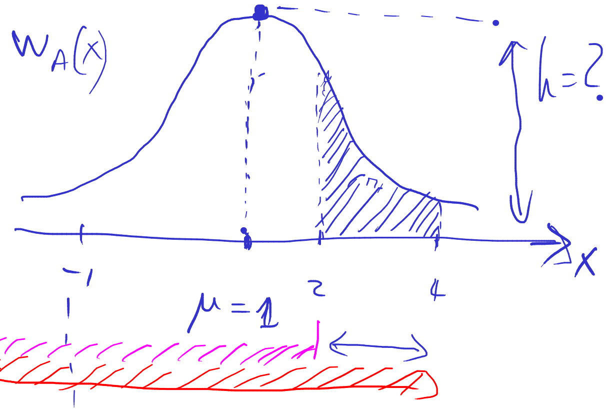
(2) $\mathcal{N}(\mu = 1, \sigma^2 = 2)$



a) $P(A \in [2, 4]) = ?$

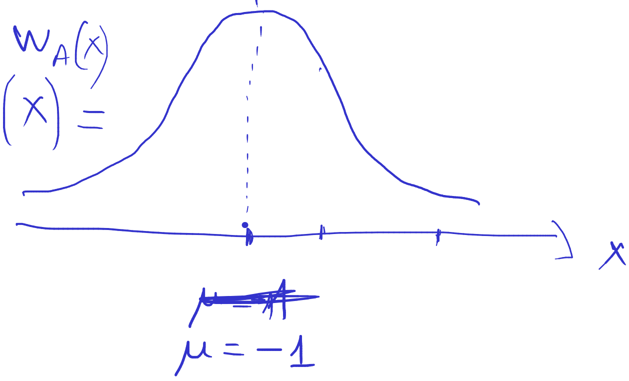
$$= \int_2^4 w_B(x)\,dx = F(4) - F(2) = 0.22$$

$$\boxed{F(x) = \frac{1}{2}\left(1 + \operatorname{erf}\left(\frac{x-\mu}{\sigma\sqrt{2}}\right)\right)}$$

$$F(4) = \frac{1}{2}\left(1 + \operatorname{erf}\left(\frac{4-1}{\sqrt{2}\cdot\sqrt{2}}\right)\right) = 0.98$$

$$F(2) = \frac{1}{2}\left(1 + \operatorname{erf}\left(\frac{2-1}{\sqrt{2}\cdot\sqrt{2}}\right)\right) = 0.76$$

b). $B = A - 2$? $w_B(x) =$



$w_B(x) = \mathcal{N}(\mu = -1, \sigma^2 = 2)$

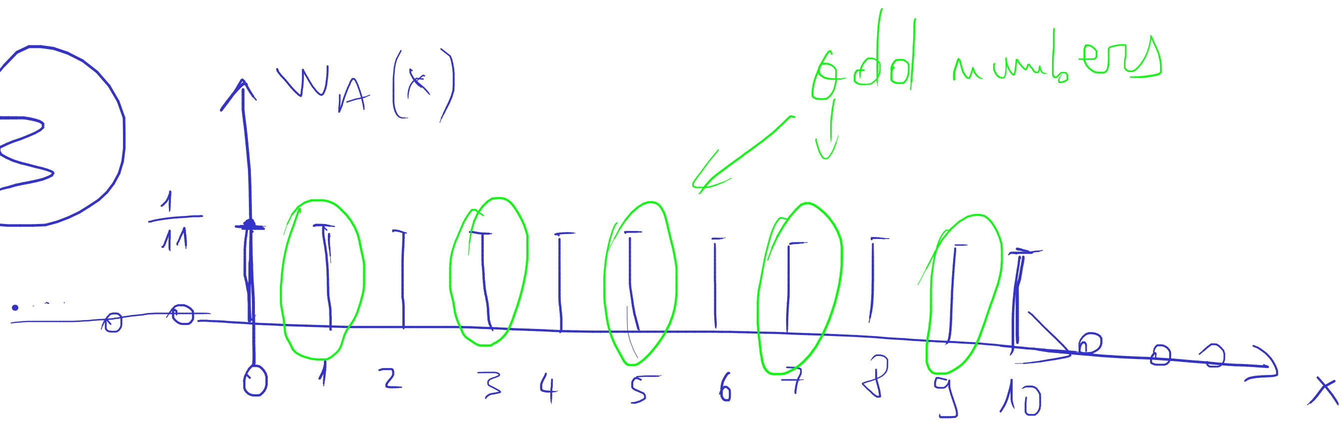
c). max is reached for $x = \mu = 1$

max value is :

$$w_A(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$$w_A(x = \mu) = \frac{1}{\sigma\sqrt{2\pi}} = \frac{1}{\sqrt{4\pi}}$$

3



a) 11

b)

c) $P(A \text{ is odd}) = \dfrac{5}{11}$

d) $P(A \in [3,7]) = \dfrac{5}{11}$

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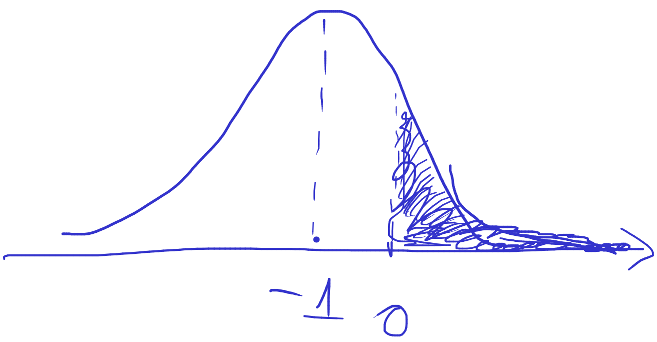
4 $P(X \geq 0 \text{ AND } Y \geq 0 \text{ AND } Z \geq 0) =$



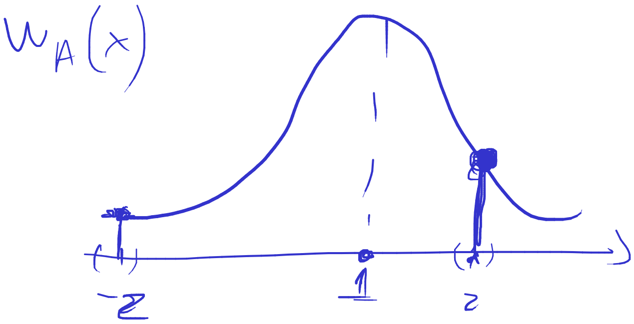
$$= \underbrace{P(X \geq 0)}_{0.16} \cdot \underbrace{P(Y \geq 0)}_{0.16} \cdot \underbrace{P(Z \geq 0)}_{0.16}$$

$$P(X \geq 0) = \int_0^\infty w(x)\,dx = \underbrace{F(\infty)}_{1} - F(0) = \boxed{0.16}$$

$$F(0) = \frac{1}{2}\left(1 + \operatorname{erf}\left(\frac{0+1}{1 \cdot \sqrt{2}}\right)\right) = 0.84$$

$$P = (0.16)^3 = \ldots.$$

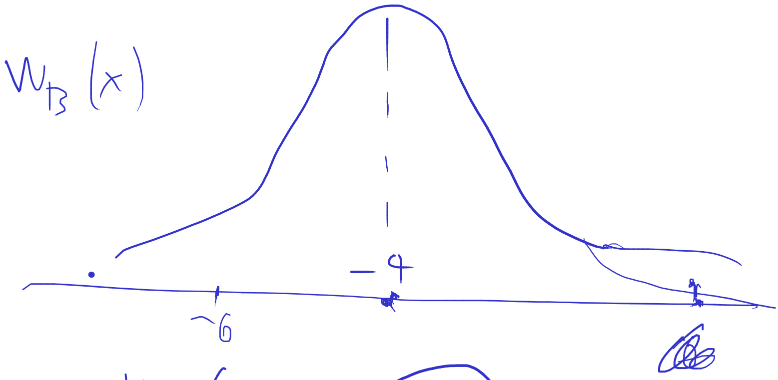
⑤ a) (A, B, C)



$(2, -6, 3)$:

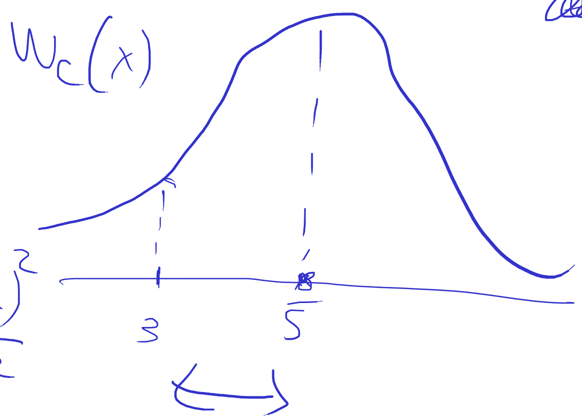
$P(A \simeq 2) \cdot P(B \simeq -6) \cdot$

$\cdot P(C \simeq 3)$



$(-2, -3, 2)$:

$P(A \simeq -2) \cdot P(B \simeq -3) \cdot P(C \simeq 2)$



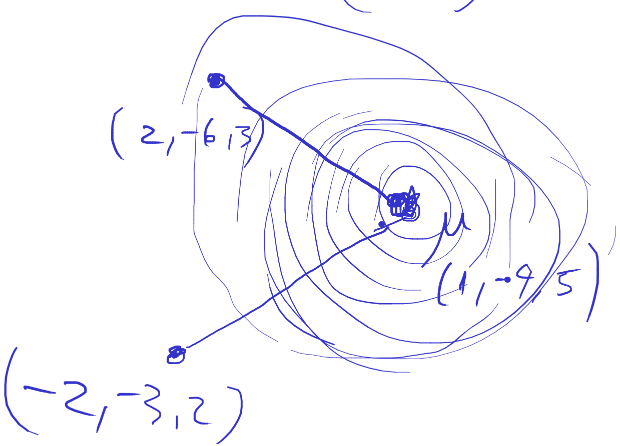
$$w(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$(2, -6, 3)$: $\frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(2-1)^2}{2\sigma^2}} \cdot \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(-6+4)^2}{2\sigma^2}} \cdot \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{(3-5)^2}{2\sigma^2}}$

$$= \left(\frac{1}{\sigma\sqrt{2\pi}}\right)^3 \cdot e^{-\frac{(2-1)^2 + (-6+4)^2 + (3-5)^2}{2\sigma^2}}$$

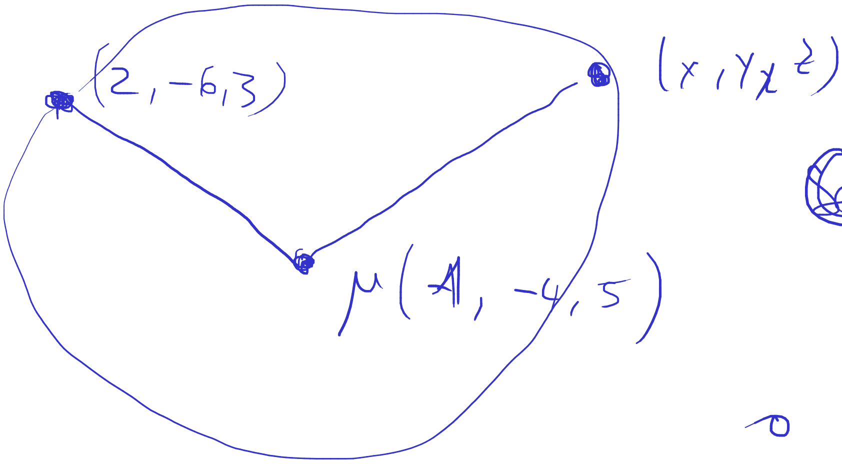
$(2-1)^2 + (-6+4)^2 + (3-5)^2 = 1 + 4 + 4$

$d\left((2,-6,3), (1,-4,5)\right)^2$



$$d^2 = \left((-2-1)^2 + (-3+4)^2 + (2-5)^2\right)$$

9 1 9



Choose

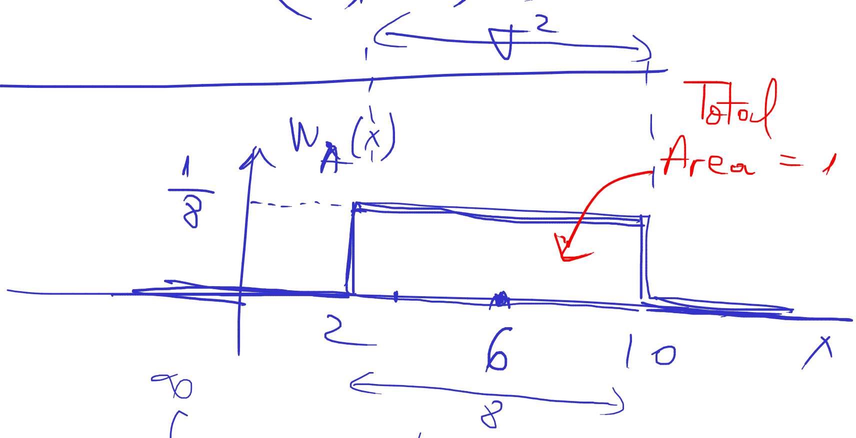
$$(2-1)^2 + (-6+4)^2 + (3-5)^2 = (\overset{0}{x}-1)^2 + (\overset{-2}{y}+4)^2 + (\overset{3}{z}-5)^2$$

choose x, y, z as you want

(0, −2, 3)

6

$U[2, 10]$



$$\mu = ? = \underline{6} = \int_{-\infty}^{\infty} x \cdot w(x)\,dx$$

$$\overline{A^2} = ? = \int_{-\infty}^{\infty} x^2\, w(x)\,dx = \int_2^{10} x^2 \cdot \frac{1}{8}\,dx = \frac{1}{8}\cdot \frac{x^3}{3}\Big|_2^{10}$$

$$\sigma^2 = ?$$

$$= \frac{1}{8}\left(\frac{10^3}{3} - \frac{2^3}{3}\right)$$

$$=$$

$$\sigma^2 = \int_{-\infty}^{\infty} (x-\mu)^2\, w(x)\,dx = \int_{-\infty}^{\infty} (x-6)^2 \cdot \frac{1}{8}\,dx =$$

$$= \frac{1}{8}\left(\int_2^{10} x^2 dx - 12\int_2^{10} x\,dx + 36\int_2^{10} 1\cdot dx\right) = \frac{1}{8}\left(\frac{x^3}{3}\Big|_2^{10} - 12\cdot\frac{x^2}{2}\Big|_2^{10} + 36\cdot x\Big|_2^{10}\right)$$