

# Goldsmith Functions

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# Contents

<b>1</b>	<b>Abstract</b>	<b>3</b>
<b>2</b>	<b>Introduction</b>	<b>4</b>
<b>3</b>	<b>Proceedings</b>	<b>5</b>
3.1	Inputs . . . . .	5
3.2	Formulas . . . . .	5
3.3	Explonation . . . . .	6
3.4	Outputs . . . . .	6
3.5	Interpretation of outputs . . . . .	6
3.6	Examples . . . . .	6
<b>4</b>	<b>Conlusions</b>	<b>7</b>
<b>5</b>	<b>Refrences</b>	<b>8</b>
<b>6</b>	<b>Appendicies</b>	<b>9</b>

# **1 Abstract**

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## **2 Introduction**

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### 3 Proceedings

#### 3.1 Inputs

The formulas have several inputs. while some are used as placeholders in definitions, others have actual meaning in the context of the application of the functions.

**Definition of Variables (by function):**

$\Xi(v; w; x; y; z)$ : All inputs to this function are placeholders.  $v, w, x, y, z \in \mathbb{R}$

$Rd_n(x)$ ;  $Ex_n(x)$ : All inputs to this function are placeholders.  $x \in [0; 100]$ ;  $n \in \mathbb{N}_0$

$\Theta(r)$ ;  $\beta(r)$ :  $r$  is a variable which controls the sensitivity of the  $\Phi_e, \Phi_0$  and  $\Phi_n$  functions.  $r \in \mathbb{Z}$

$\Phi_e(c; r)$ ;  $\Phi_0(c; r)$ ;  $\Phi_n(c; r)$ :  $c$  is the main input variable of the  $\Phi_e, \Phi_0$  and  $\Phi_n$  functions. It can be thought of as „purity“ or other qualities. (see Examples section for more details.)  $c \in [0; 1]$  (for  $\Phi_e$   $c \in [\Theta(r); 1]$ );  $r$  is a variable which controls the sensitivity of the  $\Phi_e, \Phi_0$  and  $\Phi_n$  functions.  $r \in \mathbb{Z}$

$\Lambda_0(s; r)$ ;  $\Lambda_n(s; r)$ :  $s$  is the score calculated from  $c$  using  $\Phi_0$  or  $\Phi_n$ .  $s \in ]-\infty; 100]$ ;  $r$  is a variable which controls the sensitivity of the  $\Lambda_0$  and  $\Lambda_n$  functions.  $r \in \mathbb{Z}$

$\delta(x)$ ;  $\delta_s(x)$ : All inputs to this function are placeholders.  $x \in [0; 1[$

$\chi(x)$ : All inputs to this function are placeholders.  $x \in [0; \infty[$

#### 3.2 Formulas

$$\Xi(v; w; x; y; z) = \begin{cases} v & \text{for } y > z \\ w & \text{for } y = z \\ x & \text{for } y < z \end{cases} \quad (1)$$

$$Rd_n(x) = x \cdot 10^n + 100 \cdot (1 + 10^n) \quad (2)$$

$$Ex_n(x) = Rd_{-n}(x) \quad (3)$$

$$\Theta(r) = (1 + 10^{-r})^{-9} \quad (4)$$

$$\beta(r) = 9 \cdot \log_{10}(1 + 10^{-r}) \quad (5)$$

$$\Phi_e(c; r) = 100 \cdot \sqrt{1 + \frac{\log_{10}(c)}{\beta(r)}} \quad (6)$$

$$\Phi_0(c; r) = \Xi(\Phi_e(c; r); \Phi_e(c; r); 0; c; \Theta(r)) \quad (7)$$

$$\Phi_n(c; r) = Rd_n(\Phi_0(c; r)) \quad (8)$$

$$\Lambda_0(s; r) = 10^{\beta(r) \cdot ((\frac{s}{100})^2 - 1)} \quad (9)$$

$$\Lambda_n(s; r) = \Lambda_0(Ex_n(s); r) \quad (10)$$

$$\delta(x) = -\log_{10}(1 - x) \quad (11)$$

$$\delta_s(x) = -\lfloor \log_{10}(1 - x) \rfloor \quad (12)$$

$$\chi(x) = \sum_{k=1}^x \left( \frac{9}{10^k} \right) = 1 - 10^{-x} \quad (13)$$

**3.3 Explonation**

**3.4 Outputs**

**3.5 Interpretation of outputs**

**3.6 Examples**

## 4 Conclusions

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## 5 References

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## 6 Appendicies

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