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(2/3)*((1+3*(x*((-1/6)*j-(1/3)))+(1/6)*j+(1/3))-j))/(x*((-1/6)*j-(1/3)))+(1/6)*j+(1/3)) ☆ ☰



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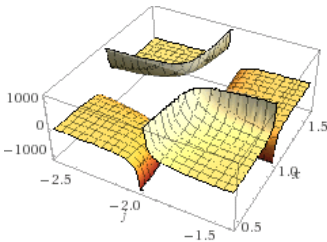
$$\frac{2}{3} \times \frac{1 + 3 \left(x \left(-\frac{j}{6} - \frac{1}{3} \right) + \frac{1}{6} j + \frac{1}{3} \right) - j}{x \left(-\frac{j}{6} - \frac{1}{3} \right) + \frac{1}{6} j + \frac{1}{3}}$$

Exact result:

$$\frac{2 \left(3 \left(\left(-\frac{j}{6} - \frac{1}{3} \right) x + \frac{j}{6} + \frac{1}{3} \right) - j + 1 \right)}{3 \left(\left(-\frac{j}{6} - \frac{1}{3} \right) x + \frac{j}{6} + \frac{1}{3} \right)}$$

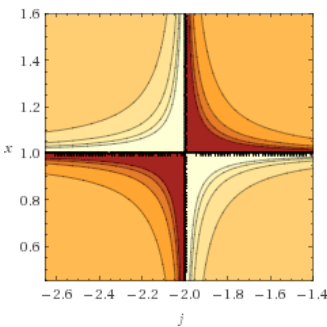
3D plot:

Show contour lines



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Contour plot:



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Alternate forms:

More forms Step-by-step solution

$$\frac{2 (j (-x) - j - 2 x + 4)}{(j + 2) (1 - x)}$$

$$\frac{4 (j - 1)}{(j + 2) (x - 1)} + 2$$

$$\frac{2 (j x + j + 2 x - 4)}{(j + 2) (x - 1)}$$


Alternate form assuming j and x are positive:

$$-\frac{2 j}{3 \left(\left(-\frac{j}{6} - \frac{1}{3} \right) x + \frac{j}{6} + \frac{1}{3} \right)} + \frac{2}{3 \left(\left(-\frac{j}{6} - \frac{1}{3} \right) x + \frac{j}{6} + \frac{1}{3} \right)} + 2$$

Expanded form:

Step-by-step solution

$$\frac{2 j x + 2 j + 4 x - 8}{j x - j + 2 x - 2}$$

 **FUN FACT:**
How long does it take a pumpkin seed to germinate? »

X

Root:
 $j + 2 \neq 0, \quad x = \frac{4-j}{j+2}, \quad j - 1 \neq 0$

Integer roots: More roots
 $j = -8, \quad x = -2$
 $j = -5, \quad x = -3$
 $j = -4, \quad x = -4$
 $j = -3, \quad x = -7$
 $j = -1, \quad x = 5$

Property as a real function:
Domain:
 $\{x \in \mathbb{R} : j + 2 \neq 0 \text{ and } x \neq 1\}$
 \mathbb{R} is the set of real numbers »

Series expansion at x=0:
$$\frac{8-2j}{j+2} + \frac{(4-4j)x}{j+2} + \frac{(4-4j)x^2}{j+2} + \frac{(4-4j)x^3}{j+2} + \frac{(4-4j)x^4}{j+2} + O(x^5)$$

Series expansion at x=∞:
$$2 + \frac{4(j-1)}{(j+2)x} + \frac{4(j-1)}{(j+2)x^2} + \frac{4(j-1)}{(j+2)x^3} + O\left(\left(\frac{1}{x}\right)^4\right)$$

Derivative: Step-by-step solution
$$\frac{d}{dx} \left(\frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} \right) = -\frac{4(j-1)}{(j+2)(x-1)^2}$$

Indefinite integral: Step-by-step solution
$$\int \frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} dx = \frac{2((j+2)(x-1) + 2(j-1)\log(x-1))}{j+2} + \text{constant}$$

 $\log(x)$ is the natural logarithm »

Limit:
$$\lim_{x \rightarrow \pm\infty} \frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} = 2$$

Series representations:
$$\frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} = \frac{8-2j}{2+j} + \sum_{n=1}^{\infty} \frac{x^n (4-4j)}{2+j}$$

$$\frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} = 2 + \sum_{n=1}^{\infty} \frac{(-1+j)^n \left(-4 \left(-\frac{1}{3} \right)^n \right)}{-1+x}$$

$$\frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} = \frac{2(-2+x)}{-1+x} + \sum_{n=1}^{\infty} \frac{j^n \left(-3(-1)^n 2^{1-n} \right)}{-1+x}$$

$$\frac{2 \left(1 - j + 3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right) \right)}{3 \left(\frac{1}{3} + \frac{j}{6} + \left(-\frac{1}{3} - \frac{j}{6} \right) x \right)} = \sum_{n=-\infty}^{\infty} \left(\left\{ \begin{matrix} 2 & n=0 \\ \frac{4(-1+j)}{2+j} & n=-1 \end{matrix} \right\} \right) (-1+x)^n$$

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