

Due date: _____

Name: _____

Tools for Modeling (Part 2)

Notes

ex: Given that $f(x) = \frac{2-5\ln x}{x^2}$, find all x -values where $f(x) = 0$ or $f(x)$ is undefined.

ex: Simplify the function $f(x) = \frac{3(x^2+1)^{2/3} \cdot 2 - 2x \cdot 2(x^2+1)^{-1/3} \cdot 2x}{9(x^2+1)^{4/3}}$. Then find all x -values where $f(x) = 0$ or $f(x)$ is undefined.

1. For each of the following functions $f(x)$, find all x -values where $f(x) = 0$ or $f(x)$ is undefined.
 - a) $f(x) = 4x + 5x \ln x$

b) $f(x) = 2 - \frac{8}{x^2}$

c) $f(x) = 2x^{-4/3} - 4x^{-1/3}$

2. For each of the following functions $f(x)$, first simplify the function. Then find all x -values where $f(x) = 0$ or $f(x)$ is undefined.

a) $f(x) = \frac{(x-3)^2 \cdot 4x - 2x^2 \cdot 2(x-3)}{(x-3)^4}$

$$\text{b) } f(x) = \frac{2x(x-2)^{1/2} - x^2 \cdot \frac{1}{2}(x-2)^{-1/2}}{x-2}$$

Practice at home

3. For each of the following functions $f(x)$, find all x -values where $f(x) = 0$ or $f(x)$ is undefined.

$$\text{a) } f(x) = \frac{9 \ln x - 6x \ln x + x^2 \ln x}{x-1}$$

$$\text{b) } f(x) = e^{\sin x} \cos x - e^{\sin x} \sin x$$

c) $f(x) = 2 - \frac{5}{x} - \frac{3}{x^2}$

d) $f(x) = \frac{1}{x^2} - 3$

e) $f(x) = 9x^{-1/3} - x^{-7/3}$

f) $f(x) = 7x^{-5/4} + x^{-1/4}$

4. For each of the following functions $f(x)$, first simplify the function. Then find all x -values where $f(x) = 0$ or $f(x)$ is undefined.

a) $f(x) = \frac{(x+2)^2(2x-3)-2(x+2)(3)}{(x+2)^4}$

b) $f(x) = \frac{2x(x+3)^4 - x^2(4)(x+3)^3}{(x+3)^8}$

$$\text{c) } f(x) = \frac{(2-x^2)^{1/2} \cdot (-2) - (-2x) \cdot \frac{1}{2}(2-x^2)^{-1/2} \cdot (-2x)}{((2-x^2)^{1/2})^2}$$

$$\text{d) } f(x) = \frac{2(x^2+2)^{3/4} - x \cdot 2 \cdot \frac{3}{4}(x^2+2)^{-1/4} \cdot 2x}{4(x^2+2)^{3/2}}$$