

SOLVE FOR x

① $2\log_3(5x-1) - 4 = 30$

$2\log_3(5x-1) = 34$

$\log_3(5x-1) = 17$

$5x-1 = 3^{17}$

$5x = 3^{17} + 1$

$x = \frac{3^{17} + 1}{5}$

② $8e^{5x-7} - 2 = 4$

$8e^{5x-7} = 6$

$e^{5x-7} = \frac{3}{4}$

$5x-7 = \log_e\left(\frac{3}{4}\right)$

$5x = \log_e\left(\frac{3}{4}\right) + 7$

$x = \frac{\log_e\left(\frac{3}{4}\right) + 7}{5}$

③ $15 + \log_e(27x-3) = 4$

$\log_e(27x-3) = -11$

$27x-3 = e^{-11}$

$27x = e^{-11} + 3$

$x = \frac{e^{-11} + 3}{27}$

④ $\frac{5^{2x-7}}{4} + 3 = 7$

$\frac{5^{2x-7}}{4} = 4$

$5^{2x-7} = 16$

$2x-7 = \log_5(16)$

$2x = \log_5(16) + 7$

$x = \frac{\log_5(16) + 7}{2}$

$$\textcircled{5} \quad 7(5^x) = 4(5^{2x})$$

$$\frac{7}{4} = \frac{5^{2x}}{5^x} = 5^x$$

$$x = \log_5\left(\frac{7}{4}\right)$$

$$\textcircled{6} \quad \log_e(4x^2 - 2x) = \log_e(2x) - 37$$

$$\log_e(4x^2 - 2x) - \log_e(2x) = -37$$

$$\log_e\left(\frac{4x^2 - 2x}{2x}\right) = -37$$

$$\log_e(2x - 1) = -37$$

$$2x - 1 = e^{-37}$$

$$2x = e^{-37} + 1$$

$$x = \frac{e^{-37} + 1}{2}$$

$$\textcircled{7} \quad 2(e^x)^{5x^2} + 8 = 9$$

$$2(e^x)^{5x^2} = 1$$

$$2e^{5x^3} = 1$$

$$e^{5x^3} = \frac{1}{2}$$

$$5x^3 = \log_e\left(\frac{1}{2}\right)$$

$$x^3 = \frac{\log_e\left(\frac{1}{2}\right)}{5}$$

$$x = \sqrt[3]{\frac{\log_e\left(\frac{1}{2}\right)}{5}}$$

$$\textcircled{8} \quad \log_e(3x - 7) = -8$$

$$\log_e(3x - 7) = -8$$

$$3x - 7 = e^{-8}$$

$$3x = e^{-8} + 7$$

$$x = \frac{e^{-8} + 7}{3}$$

Graphing Rational Functions

$$r(x) = \frac{8(x-3)}{-5(x+1)(x^2-x+4)}$$

① What are the vertical asymptotes?

② What are the x -intercepts?

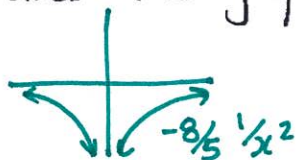
③ Is $r(x)$ positive or negative between pairs of points from ① & ②?

$$r(1) = \frac{8(-2)}{-5(2)(1-1+4)} > 0$$

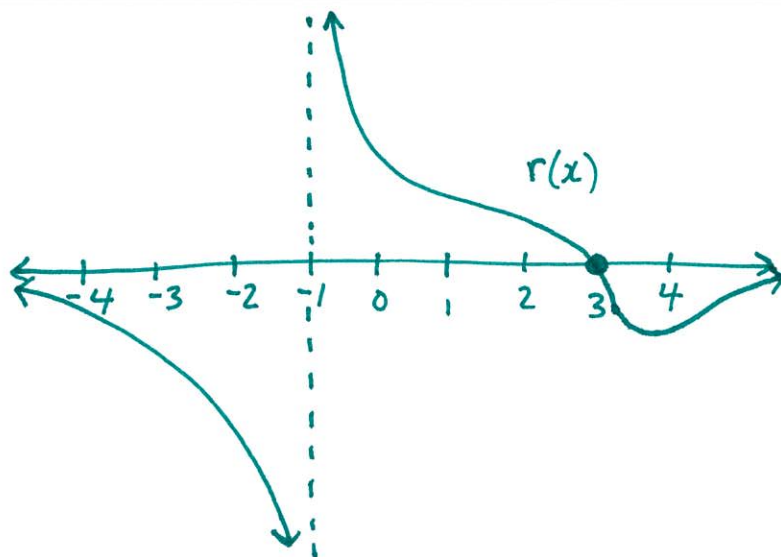
④ What's the leading term of $8(x-3)$? Of $-5(x+1)(x^2-x+4)$?
What's the quotient of those leading terms?

$$8x, -5x^3, \frac{8x}{-5x^3} = -\frac{8}{5} \frac{1}{x^2}$$

⑤ What does the graph of $r(x)$ look like on the right and left?

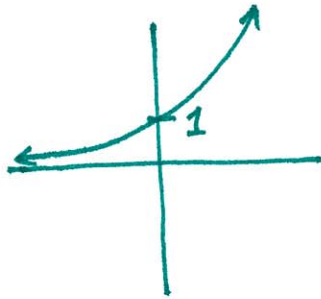


⑥ Graph $r(x)$.

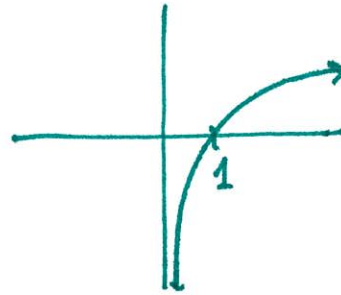


Graphing exponentials and logarithms

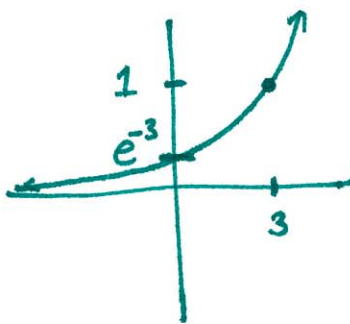
① Graph e^x



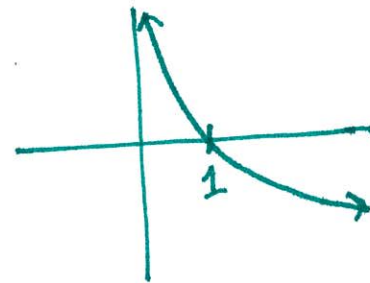
② Graph $\log_e(x)$



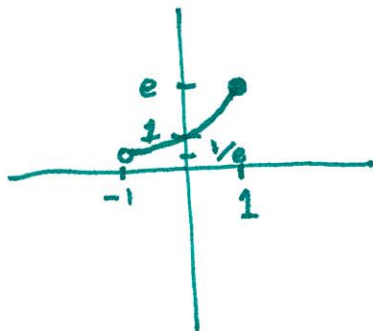
③ Graph e^{x-3}



④ Graph $-2\log_e(x)$



⑤ Graph $f: (-1, 1] \rightarrow \mathbb{R}$
where $f(x) = e^x$



⑥ Graph $g: (0, 1) \rightarrow \mathbb{R}$
where $g(x) = \log_e(x)$

