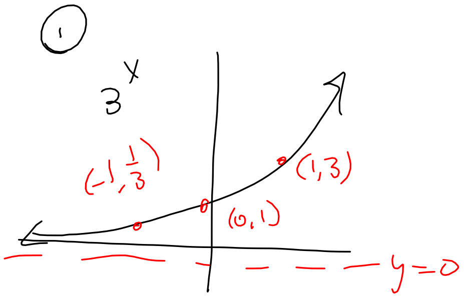
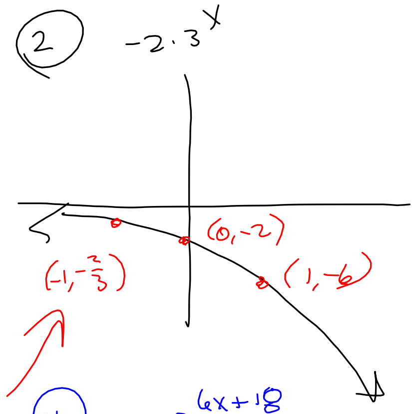
1 $-2\cdot 3^{6x+18}+4$

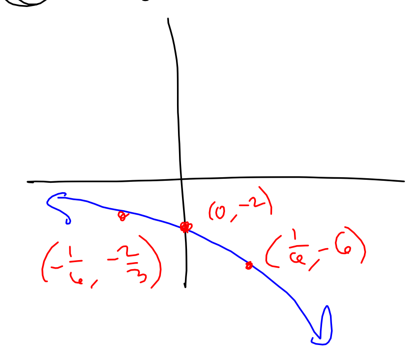
① 3^x



② $-2\cdot 3^x$



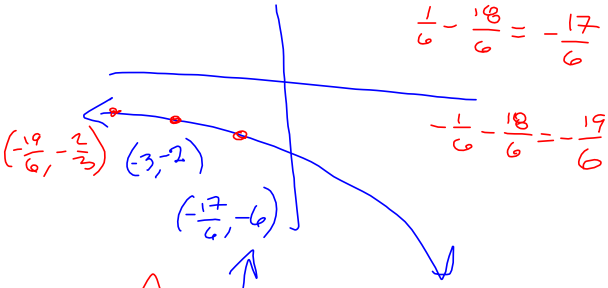
③ $-2\cdot 3^{6x}$



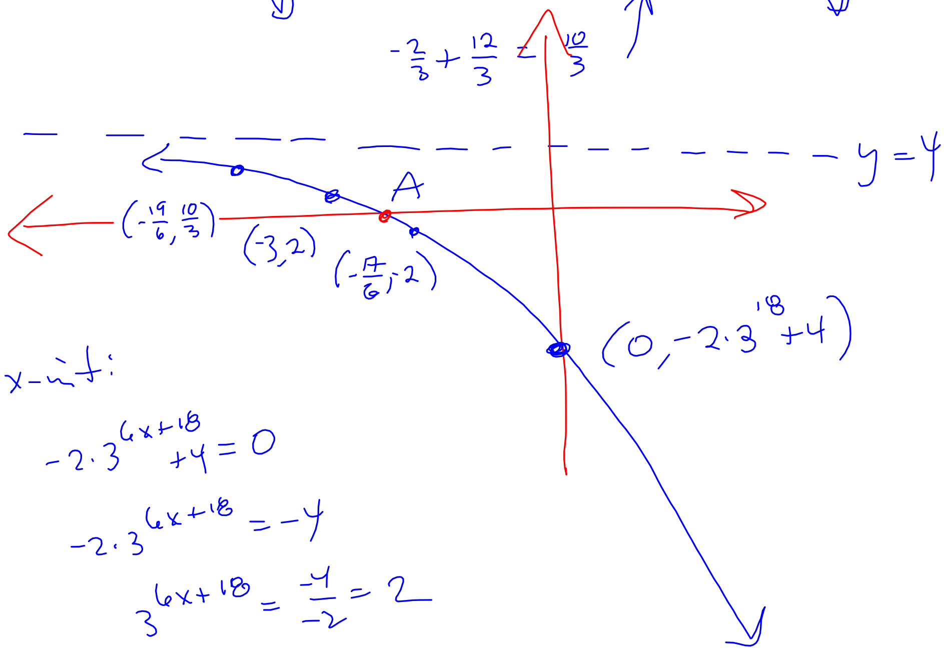
④ $-2\cdot 3^{6x+18} = -2\cdot 3^{6(x+3)}$

$\frac{1}{6}-\frac{18}{6}=-\frac{17}{6}$

$-\frac{1}{6}-\frac{18}{6}=-\frac{19}{6}$



$-\frac{2}{3}+\frac{12}{3}=\frac{10}{3}$



x-int:

$-2\cdot 3^{6x+18}+4=0$

$-2\cdot 3^{6x+18}=-4$

$3^{6x+18}=\frac{-4}{-2}=2$

$\log_3\left(3^{6x+18}\right)=\log_3(2)$

$6x+18=\log_3(2)$

$6x=\log_3(2)-18$

$x=\frac{\log_3(2)-18}{6}$

$$\boxed{A=\left(\frac{\log_3(2)-18}{6},\ 0\right)}$$

(3) $f(x)=\sqrt{3x+1}$, $g(x)=\frac{5}{x-5}$

(a) $\mathcal{D}(f) =$

Need

$3x+1 \geq 0$

$3x \geq -1$

$\{x \mid x \geq -\frac{1}{3}\} = [-\frac{1}{3}, \infty)$

(b) $\mathcal{D}(g) = \mathbb{R} \setminus \{5\}$

Need

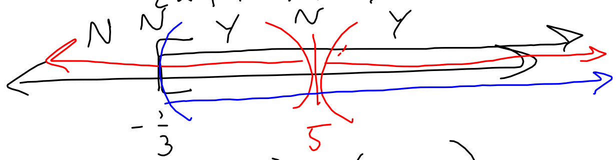
$x-5 \neq 0$

$\{x \mid x \neq 5\} = (-\infty, 5) \cup (5, \infty)$

(c) $\left(\frac{g}{f}\right)(x) = \dfrac{\frac{5}{x-5}}{\sqrt{3x+1}}$

(d) $\mathcal{D} = \mathcal{D}(f) \cap \mathcal{D}(g) \cap$

$\{x \mid f(x) \neq 0\}$



$= (-\frac{1}{3}, 5) \cup (5, \infty)$

(e) $f \circ g = f(g(x))$

$= \sqrt{3\left(\frac{5}{x-5}\right)+1}$

4) $\sqrt{\dfrac{(x-3)(x+5)^3}{(x-4)^2}} = f(x)$

$\mathcal{D}(f)$: Need $\dfrac{(x-3)(x+5)^3}{(x-4)^2} \geq 0$

Y Y N Y Y N Y

+ − + +

-5 3 4

$=0$ $=0$ ☆

≥ 0

$(-\infty,-5]\cup[3,4)\cup(4,\infty)$

5) $\ln\left(\dfrac{(x-3)(x+5)^3}{(x-4)^2}\right)$

Need $\dfrac{(x-3)(x+5)^3}{(x-4)^2} > 0$

Throw out the $=0$'s from #4!

$$\boxed{(-\infty,-5)\cup(3,4)\cup(4,\infty)}$$

$f(x) = 2^{3x-7} + 5 = y$

Find $f^{-1}(x)$

$2^{3y-7} + 5 = x$ Solve for y

$2^{3y-7} = x - 5$

$\log_2(2^{3y-7}) = \log_2(x-5)$

$3y - 7 = \log_2(x-5)$

$3y = \log_2(x-5) + 7$

$y = \boxed{\dfrac{\log_2(x-5) + 7}{3} = f^{-1}(x)}$

7 $\ln(\overset{-2-3}{x-3}) + \ln(\overset{-2}{x}+2) = \ln(2x+4)$

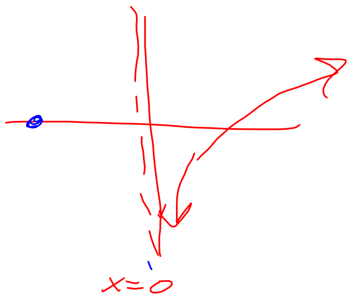
$\ln((x-3)(x+2)) = \ln(2x+4)$

$x^2-x-6 = 2x+4$

$x^2-3x-10=0$

$(x-5)(x+2)=0$

$x \in \{5, -2\}$ → $\notin D$



8a

$$A(t) = A_0 e^{kt}$$

$\frac{1}{2}$-life is 5900 yrs

$$A(5900) = A_0 e^{5900k} = \frac{1}{2} A_0$$

$$e^{5900k} = \frac{1}{2}$$

$$5900k = \ln\left(\frac{1}{2}\right) = -\ln(2)$$

$$\boxed{k = \frac{-\ln(2)}{5900}}$$

b 43% decayed, so 57% remains, so

$$A_0 e^{kt} = .57 A_0$$

$$e^{kt} = .57$$

$$\ln(e^{kt}) = \ln(.57)$$

$$kt = \ln(.57)$$

$$t = \frac{\ln(.57)}{k} = \frac{\ln(.57)}{\frac{-\ln(2)}{5900}}$$

$$= (\ln(.57))\left(\frac{5900}{-\ln(2)}\right)$$

```
360*10)
          824.3320149
500e^(.05*10)
          824.3606354
ln(.57)*5900/ln(
.5)
          4784.700436
```

$\approx$ $\boxed{\text{4785 yrs old}}$

$|-5x+8|-11>-2$

$|-5x+8|>9$

$-5x+8>9$ OR $-5x+8<-9$

$-8 = -8$

$-5x>1$

$-5x<-17$

$x>\frac{-17}{-5}=\frac{17}{5}$

$\{x \mid x<-\frac{1}{5}$ OR $x>\frac{17}{5}\}$

$(-\infty,-\frac{1}{5}) \cup (\frac{17}{5},\infty)$