① Constant term: $-12 \rightarrow$ Factors: $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

Leading Coeff: $1 \rightarrow$ Factor: ± 1,

Possible rational zeros: $\frac{p}{q}$ where p is a factor of the constant term and q is a factor of leading coeff.

So, $\frac{p}{q}$ is in $\{\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12\}$

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② -5 is a zero $\rightarrow x+5$ is a factor

i is a zero $\rightarrow -i$ is also a zero

$\rightarrow (x-i)(x+i) = x^2+1$ is a factor.

So, $f(x) = \boxed{a}(x+5)(x^2+1)$

leading coeff.

$f(-3) = a\cdot(-3+5)((-3)^2+1) = 60$

So, $20a = 60$. So, $a = 3$

$f(x) = 3\cdot(x+5)(x^2+1) = 3\cdot(x^3+5x^2+x+5)$

$\boxed{f(x) = 3x^3+15x^2+3x+15}$

③ $x^2-4x=0 \rightarrow x(x-4)=0 \rightarrow x=0$ or $x=4$

Domain $= \{x \mid x \neq 0$ and $x \neq 4\}$

Interval Notation: $(-\infty,0)\cup(0,4)\cup(4,\infty)$

④ $\dfrac{x-9}{x^2-10x+24} = \dfrac{x-9}{(x-6)(x-4)}$

$\rightarrow (x-6)(x-4)=0 \rightarrow x=6$; $x=4$

V.A.: $\boxed{x=6}$ and $\boxed{x=4}$

⑤ This is the scenario where degree top = degree bottom

$\rightarrow$ H.A.: $y = \dfrac{\text{leading coeff. top}}{\text{leading coeff. bottom}}$

$\boxed{y = \frac{8}{9}}$

⑥ V.A. $(x-1)(x+1)=0 \rightarrow x=1$; $x=-1$

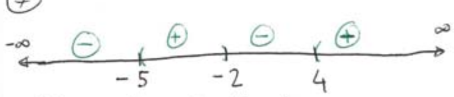
H.A. degree top $<$ degree bottom $\rightarrow y=0$.

x-intercept: $(0,0)$.

The only graph with all these properties is

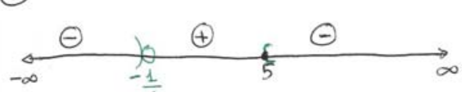
Ⓐ

⑦



Solution: $(-5,-2)\cup(4,\infty)$

⑧



Solution: $(-\infty, -\frac{1}{6}) \cup [5,\infty)$

⑨ $D(9) = 6e^{(-0.4)(9)} \approx \boxed{0.16\text{ (mg)}}$

⑩ $5^3 = x \leftrightarrow \boxed{\log_5 x = 3}$

⑪ $\log_b 64 = 3 \leftrightarrow \boxed{b^3 = 64}$

⑫ $x^2-1=0 \leftrightarrow (x-1)(x+1)=0$

$\leftrightarrow x=1$ or $x=-1$

Domain $= \{x \mid x \neq 1$ and $x \neq -1\}$

Interval notation: $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$

⑬ Domain: Set $2-x>0$

$\leftrightarrow -x > -2$

$\leftrightarrow x < 2$

Domain: $\boxed{(-\infty,2)}$

⑭ $f(206) = 1+1.5\ln(207) \approx \boxed{9}$

(17) $f(x) = \dfrac{x-1}{x^2-4x-5} = \dfrac{x-1}{(x-5)(x+1)}$

V.A. $(x-5)(x+1)=0 \rightarrow x=5;\ x=-1.$

H.A. $y=0$ (degree top < degree bottom)

x-intercept: Set $f(x)=0$

$\rightarrow x-1=0 \rightarrow x=1$

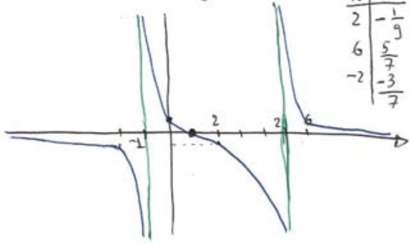
x-intercept: $(1,0)$

y-intercept: Set $x=0$: $\dfrac{-1}{(-5)\cdot(1)} = \dfrac{1}{5}$.

y-intercept: $\left(0, \dfrac{1}{5}\right)$

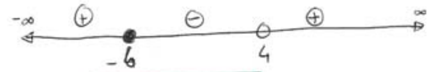
T-table

x	$f(x)$
2	$-\frac{1}{9}$
6	$\frac{5}{7}$
-2	$-\frac{3}{7}$



(18) $f(x) = \log_{10}\left(\dfrac{x+6}{x-4}\right)$

To find domain: Set $\dfrac{x+6}{x-4} > 0$.



Domain: $\boxed{(-\infty,-6) \cup (4,\infty)}$

(19)