1. Slope-int. form of the line passing $(\overset{x}{5}, -\overset{y}{2})$.

& perpendicular to the line $3x - 2y = 12 \Rightarrow y = \frac{3}{2}x -$

$y = mx + b$ ← y-int.

slope

$$\boxed{y = -\tfrac{2}{3}x + \tfrac{5}{}}$$

$m = -2/3$

$$-2 = -\tfrac{2}{3}(5) + b$$

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

$$\frac{3}{5} = \frac{6}{10} = b$$

2. point-slope form pt. $(3,10)$.

parallel to $x-3y=1 \Rightarrow y=\frac{1}{3}x-\frac{1}{3}$

$y-y_1=m(x-x_1)$

$m=\frac{1}{3}$ $\boxed{y-10=\frac{1}{3}(x-3)}$

3. Find domain & range.

a) $y=\sqrt{x-7}$

D: $[7,\infty)$

R: $[0,\infty)$

b. $y=3x^2-4$

D: $(-\infty,\infty)$

R: $(-\infty,\infty)$

c. $y=\frac{5}{x-2}$

D: $(-\infty,2)\cap(2,$

R: $(-\infty,0)\cap($

19. Write each expression in expanded form.

a). $\log_3 \sqrt{\frac{x^2}{yz}}$

$= \log_3 \left(\frac{x^2}{yz}\right)^{1/2}$

$= \log_3 \left(\frac{x}{y^{1/2} z^{1/2}}\right) = \log_3 x - \left(\log_3 y^{\boxed{1/2}} + \log_3 z^{\boxed{1/2}}\right)$

$= \boxed{\log_3 x - \frac{1}{2}\log_3 y - \frac{1}{2}\log_3 z}$

19b. $\ln \frac{5x}{\sqrt[3]{x^2+1}} = \ln \frac{5x}{(x^2+1)^{1/3}} = \ln 5x - \ln (x^2+1)^{1/3}$

$$= \ln 5x - \tfrac{1}{3} \ln(x^2+1)$$

13. Find slant asymptote : $f(x) = \frac{x^2+2x+2}{2x-1}$

$$\boxed{\tfrac{1}{2}x + \tfrac{5}{4}}$$

$$
\begin{array}{r|l}
 & \tfrac{1}{2}x + \tfrac{5}{4} \\
\hline
2x-1 & \cancel{x^2} + 2x + 2 \\
 & -\ \cancel{x^2} - \tfrac{1}{2}x \\
\hline
 & \tfrac{5}{2}x + 2 \\
 & -\ \cancel{\tfrac{5}{2}x} - \tfrac{5}{4} \\
\hline
 & \boxed{\tfrac{13}{4}}
\end{array}
$$

$\frac{8}{4} + \frac{5}{4}$

$\frac{5}{2} \div 2$

$= \frac{5}{2} \times \frac{1}{2} = \frac{5}{4}$

43) a) polar $\longrightarrow$ rectangular.

$(r, \theta) \longrightarrow (x, y)$

$(r\cos\theta, r\sin\theta)$

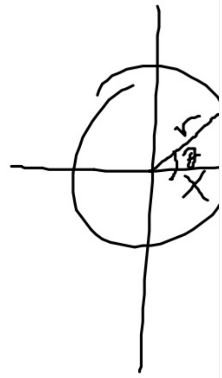
r, θ

$(-5, 5\pi/6)$

$$\left(-5\cos\frac{5\pi}{6}, -5\sin\frac{5\pi}{6}\right)$$

$$= \left(-5\left(-\frac{\sqrt{3}}{2}\right), -5\left(\frac{1}{2}\right)\right) =$$

$5\pi/6 \; (-\sqrt{3}/2$



43) b. $\theta = \pi/6$ N/A.

c. $r = 6\sin\theta$ N/A.

18c. $\frac{1}{5}\left[3\log(x+1) + 2\log(x-1) - \log 7\right]$ Condense.

$= \frac{1}{5}\left(\log \frac{(x+1)^3(x-1)^2}{7}\right) = \frac{1}{5}\log \frac{(x+1)^3(x-1)^2}{7}$

$$= \log\left(\frac{(x+1)^3(x-1)^2}{7}\right)^{1/5}$$

Find domain & range.

3c. $y = \frac{5}{x-2}$

D: $(-\infty, 2) \cap (2, \infty)$

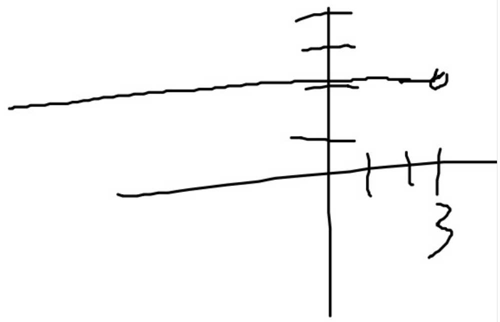
R: $(-\infty, 0) \cap (0, \infty)$

4. Find intervals where the function is inc., dec., or c

b. $\frac{-2}{x-1}$

~~is~~ dec: $(-\infty, 1) \cap (1, \infty)$.

4c. $f(x) = \begin{cases} 2 & x < 3 \\ x^2 & x \geq 3 \end{cases}$



const: $(-\infty, 3)$

inc: $[3, \infty)$

13. Find slant asymptote.

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

$$\boxed{\tfrac{1}{2}x + \tfrac{5}{4}}$$

$$2x-1 \overline{)\, x^2+2x+2}$$

$$-\ (\cancel{x^2} - \tfrac{1}{2}x) \downarrow$$

$$\cancel{\tfrac{5}{2}x} + 2$$

$$-\ (\cancel{\tfrac{5}{2}x} - \tfrac{5}{4})$$

$$\frac{5}{2} \div 2$$

$$= \frac{5}{2} \times \frac{1}{2} = \frac{5}{4}$$

$$\boxed{y = \tfrac{1}{2}x + \tfrac{5}{4}}$$

$7x$ _

$\frac{2}{}$

2

18.c. $\frac{1}{5}\left[3\log(x+1) + 2\log(x-1) - \log 7\right]$ (condense).

$= \frac{1}{5}\left[\log(x+1)^3 + \log(x-1)^2 - \log 7\right]$

$= \frac{1}{5}\left[\log \frac{(x+1)^3(x-1)^2}{7}\right]$

$= \boxed{\log\left(\frac{(x+1)^3(x-1)^2}{7}\right)^{1/5}}$.

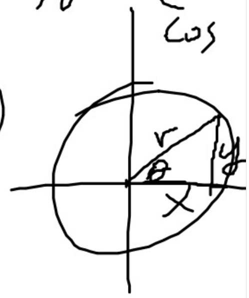
43a. Polar $\longrightarrow$ Rectangular

(r, θ) $\qquad$ (x, y)

$5\pi/6 \to \left(-\sqrt{3}/2\right.$

cos

$$\overset{r}{(-5}, \overset{\theta}{5\pi/6}) \longrightarrow (r\cos\theta, r\sin\theta)$$



$$= \left(-5\cos 5\pi/6, -5\sin 5\pi/6\right)$$

$$\boxed{= \left(-5\left(-\sqrt{3}/2\right), -5\left(1/2\right)\right)}$$

44c. rect $\longrightarrow$ polar

(x, y) $\quad$ (r, θ)

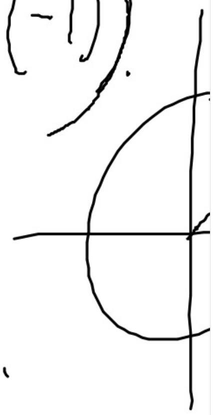
-5

$\boxed{-2x+3y}+5=0$

$(1, -1)$ $\quad$ $\left(\sqrt{x^2+y^2}, \tan^{-1}\left(\frac{y}{x}\right)\right)$ $\quad$ $\left(\sqrt{1+1}, \tan^{-1}(-1)\right)$

x, y

$=\left(\sqrt{2}, 3\pi/4\right)$



10. given $3i$ is a root find remaining roots of . . .

$$f(x) = x^4 - 6x^3 + 14x^2 - 54x + 45.$$

$\boxed{3i, -3i}$

$(x-3i)(x+3i)$

$= x^2 - 9i^2$

$= x^2 + 9$

$$
\begin{array}{r|l}
 & x^2 - 6x + 5 \\
\hline
x^2+9 & x^4 - 6x^3 + 14x^2 - 54x + 45 \\
 & -(x^4 + 9x^2) \\
\hline
 & -6x^3 + 5x^2 \\
 & -(-6x^3 - 54x) \\
\hline
 & 5x^2 + 45 \\
 & -(5x^2 + 45) \\
\hline
 & \boxed{0}
\end{array}
$$

$(x^2+9)(x^2-6x+5)$

$5, -1, -6$

$(x^2+9)(x-5)(x-1)$

$\boxed{x = 5, 1}$

37 $\frac{x^2}{9}+\frac{y^2}{12}=1$

Vertical

Vert: $(0, \pm a)$

$= (0, \pm\sqrt{12})$

29.

$(75)\tan 4^\circ = \cancel{\left(\frac{x}{75}\right)(7}$

$x \approx$ It is what i

11). Find a 4th deg. polynomial w/ zeros: 5, −2, and 2

2

$(x-5)(x+2)(x-(2-i))(x-(2+i))$.

$= (x^2-3x-10)(x^2-x(2+i)-x(2-i)+(4-i^2))$.

$= (x^2-3x-10)(x^2-2x\cancel{-ix}-2x\cancel{+ix}+4+1)$

$= (x^2-3x-10)(x^2-4x+5) = \boxed{x^4-7x^3+17x^2+25x-5}$

24c) $\sin(\arctan 2x) = \sin(\tan^{-1} 2x)$

$$= \sin\left(\frac{\sin^{-1}(2x)}{\cos^{-1}(2x)}\right)$$

$\tan\theta = \dfrac{\text{opp}}{\text{adj}}$.

$\sin\theta = \dfrac{\text{opp}}{\text{hyp}}$

~~17a~~ ~~45)~~. Condense

18c). $\frac{1}{5}\left(3\log(x+1) + 2\log(x-1) - \log 7\right)$.

$= \frac{1}{5}\left(\log(x+1)^3 + \log(x-1)^2 - \log 7\right)$.

$= \frac{1}{5}\left(\log \frac{(x+1)^3(x-1)^2}{7}\right)$

$= \boxed{\log\left(\frac{(x+1)^3(x-1)^2}{7}\right)^{1/5}}$

13). Slant asymptote: $f(x) = \dfrac{x^2+2x+2}{2x-1}$

$$\begin{array}{r} \frac{1}{2}x + \frac{5}{4} \\ 2x-1 \,\big)\, \overline{x^2 + 2x + 2} \\ -\ x^2 - \frac{1}{2}x \quad \downarrow \\ \hline \frac{5}{2}x + 2 \\ -\ \frac{5}{2}x - \frac{5}{4} \\ \hline \end{array}$$

$7 \cdot \frac{3}{\ }$

$\frac{21}{7}$

$\frac{5}{2} \div \frac{2}{1}$

$\frac{5}{2} \cdot \frac{1}{2} = \frac{5}{4}$

$$\boxed{y = \frac{1}{2}x + \frac{5}{4}}$$

19b) Expanded form.

$$\ln \frac{5x}{\sqrt[3]{x^2+1}} = \ln 5x - \ln \sqrt[3]{x^2+1}$$

$$= \ln 5x - \tfrac{1}{3}\ln (x^2+1)$$

$$= \boxed{\ln 5x - \tfrac{1}{3}\ln (x^2+1)}$$

$$= \boxed{\ln 5 + \ln x - \tfrac{1}{3}\ln (x^2+1)}$$

3) Find domain & Range. $x = \frac{-b}{2a} = \frac{0}{2(3)} = 0 \Rightarrow V:(0,-4$

a) $y = \sqrt{x-7}$

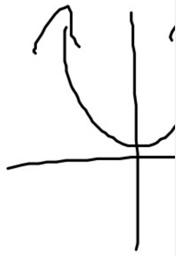
$D: [7, \infty)$

$R: [0, \infty)$

b) $y = 3x^2 - 4$

$D: (-\infty, \infty)$.

$R: [-4, \infty)$.



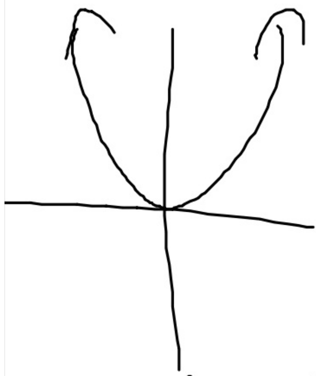
c) $\frac{5}{x-2}$

$(-\infty, 2) \cap (2, \infty)$

$R: (-\infty, 0) \cap (0, \infty)$

4. Inc, dec., or constant.

a) $y=x^2$



dec: $(-\infty,0]$

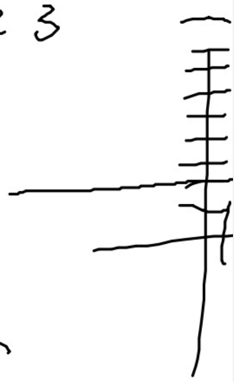
inc: $[0,\infty)$.

b) dec: $(-\infty,1)\cap(1,\infty)$.

c) $f(x)=\begin{cases} 2 & x<3 \\ x^2 & x\geq 3 \end{cases}$

Const: $(-\infty,3)$.

inc: $[3,\infty)$.



10) Given that $3i$ is a root find the remaining roots for...

$$f(x) = x^4 - 6x^3 + 14x^2 - 54x + 45$$

$3i, -3i$.

$$(x-3i)(x+3i) = x^2 - 9i^2 = x^2 + 9$$

-5

$\frac{\pm p}{\pm q}$

$$
\begin{array}{r|l}
 & \boxed{x^2 - 6x + 5} \\
x^2+9 & x^4 - 6x^3 + 14x^2 - 54x + 45 \\
\ominus & x^4 + 9x^2 \\
\hline
 & -6x^3 + 5x^2 \\
\ominus & -6x^3 - 54x \\
\hline
 & 5x^2 + 45 \\
\ominus & 5x^2 + 45 \\
\hline
 & 0
\end{array}
$$

$$f(x) = (x^2+9)(x^2-6x+5)$$

$$= (x^2+9)(x-5)(x-1)$$

$$= \boxed{3i, -3i, 5, 1}$$

1) $3x-2y=12$

$y=\boxed{\frac{3}{2}}x-6$

Perp: $-\frac{2}{3}=m$

14c. $\log_5 7$

$=\frac{\log 7}{\log 5}$ or $\frac{\ln 7}{\ln 5}$

3. Domain & Range.

a) $y=\sqrt{x-7}$

D: $[7,\infty)$

R: $[0,\infty)$

4. inc, dec, const.

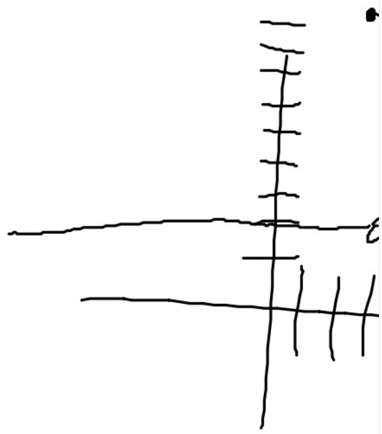
c) $f(x)=\begin{cases}2 & x<3\\ x^2 & x\geq 3\end{cases}$

Const: $(-\infty,3)$

inc: $[3,\infty)$

24. $\sin(\arctan 2x)$

$=\sin(\tan^{-1}(2x))$



(8)c. $\frac{1}{5}\left[3\log(x+1)+2\log(x-1)-\log 7\right]$

$$=\frac{1}{5}\left[\log(x+1)^3+\log(x-1)^2-\log 7\right]$$

$$=\frac{1}{5}\left[\log\left(\frac{(x+1)^3(x-1)^2}{7}\right)\right]$$

$$=\boxed{\log\left(\frac{(x+1)^3(x-1)^2}{7}\right)^{1/5}}$$

9). Completely factor $f(x) = x^3 - x + 6$, given that $(x+2)$ is a factor.

$\sqrt{8} = 2\sqrt{2}$

$$\begin{array}{r|rrrr} -2 & 1 & 0 & -1 & 6 \\ + & \downarrow & -2 & 4 & -6 \\ \hline & 1 & -2 & 3 & \boxed{0} \end{array}$$

3, $-$, -2

$$f(x) = (x+2)(x^2 - 2x + 3)$$

$$(x+2)\left(x - \left(1 + \frac{\sqrt{8}i}{2}\right)\right)\left(x - \left(1 - \frac{\sqrt{8}i}{2}\right)\right)$$

$$= \boxed{(x+2)(x - (1 + \sqrt{2}i))(x - (1 - \sqrt{2}i))}$$

$1 \pm \frac{\sqrt{8}i}{2}$

$$x = \frac{-b \pm \sqrt{b^2 - 4a}}{2a}$$

$$= \frac{2 \pm \sqrt{4 - 4(1)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4 - 1}}{2}$$

$$= \frac{2 \pm \sqrt{-8}}{2}$$

12) horiz. asym
Vert. asym. (where is the function undefined)

a) $f(x) = \frac{x+5}{x^2-4}$

Vert.
$x^2 - 4 = 0$
$x^2 = 4$
$\boxed{x = \pm 2}$

horiz.
$\boxed{y = 0}$

b) $f(x) = \frac{1x^2 - 9}{1x^2 + x - 12}$

Vert
$x^2 + x - 12 = 0$
$(x+4)(x-3) = 0$
$\boxed{x = -4, 3}$

horiz.
$\boxed{y = \frac{1}{1} = 1}$

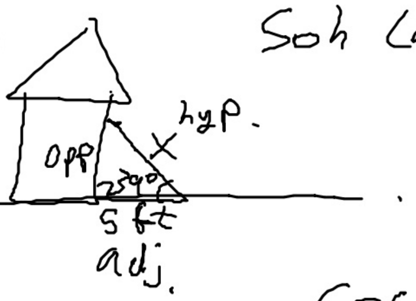
d) $f(x) = \frac{x^3}{(x-2)(x+}$

Vert.
$(x-2)(x+5) = 0$
$\boxed{x = 2, -5}$

horiz.
None

28)

Soh Cah Toa.



$$\cos 39^\circ = \frac{5}{x}$$

$$\Rightarrow \boxed{x = \frac{5}{\cos 39^\circ}}$$

20). Solve.

a) $\log_3\left(\tfrac{1}{7}x\right) = 4$

$\cancel{7} \cdot \cancel{\tfrac{1}{7}}x = 81 \cdot 7$

$x = 567$

26. period, amp, phase shift

c. $f(x) = -4\cos\left(\frac{x}{4} - \pi\right)$,

$= -4\cos\left(\frac{1}{4}x - \pi\right)$.

Per: $\frac{2\pi}{1/4} = \boxed{8\pi}$

amp: $|-4| = 4$

Shift: right π

37) Vert of ellipse: $\frac{x^2}{9}+\frac{y^2}{12}=1$. vert. $\left(\frac{x^2}{b^2}+\frac{y^2}{a^2}=1\right)$

vertical.

vertices: $(0, \pm a)$

$$=\boxed{(0, \pm\sqrt{12})}$$

5). Describe the transformation.

$f(x)$ = parent = preimage.

$g(x)$ = transformed = image.

a). $f(x) = x^2$

$g(x) = 5(x-1)^2$

right 1

Vert. stretch by 5

or

horiz. compression by $1/5$