10. Given that $3i$ is root of function, find the remaining roots.

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

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

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

$$x^2+9 \;\overline{)\; x^4 - 6x^3 + 14x^2 - 54x + 45}$$

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

$-x^4 \quad +9x^2$

$-6x^3 + 5x^2 - 54x$

$+6x^3 \quad +54x$

$5x^2 + 45$

$-5x^2 - 45$

0

$-5 \;\big|\; 1 \quad -6 \quad 5$

$\qquad\quad -5 \quad 55$

$\qquad\quad 1 \quad -11 \quad 60$

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

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

$3i, -3i, 5, 1$

12. horiz asymptote
Vert. asymptote.

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

Vertical

$x^2 - 4 = 0$

$x^2 = 4$

$x = \pm 2$

HA

$y = 0$

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

Vert.

$x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$

$x = -4, 3$

HA

$y = \frac{1}{1} = 1$

d) $\frac{x^3}{(x-2)(x+5)}$

Vert.

$x = 2, -5$

HA

None.

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

VA

$x = 2, -1$

HA

5/1

27) Simplify

a) $\frac{1-\cos^4 x}{1+\cos^2 x} = \frac{(1+\cos^2 x)(1-\cos^2 x)}{1+\cos^2 x} = 1-\cos^2 x = \boxed{\sin^2 x}$

b) $\sin^2 x \cot^2 x + \sin^2 x = \sin^2 x(\cot^2 x + 1)$

$= \sin^2 x \sec^2 x = \sin^2 x \frac{1}{\cos^2 x}$

$= \frac{\sin^2 x}{\cos^2 x} = \boxed{\tan}$

c) $\frac{1-\csc x}{\csc x} = \frac{1}{\csc x} - \frac{\csc x}{\csc x}$

$= \boxed{\sin x - 1}$

d) $2\sin^2 x + \cos^2 x - 1$

$= 2(1-\cos^2 x) + \cos^2 x - 1$

$= 2 - 2\cos^2 x + \cos^2 x - 1 = 2 - \cos^2 x - 1$

$= -\cos^2 x + 1 = 1 - \cos^2 x = \boxed{\sin^2 x}$

24) Evaluating.

a) $\sin\left(\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$

$\sin\left(\frac{5\pi}{6}\right) = \frac{1}{2}$; $-\frac{1}{2}$

b) $\tan(\sin^{-1}0)$

$\tan(\pi)$ or $\tan(0)$

$= 0$

Soh Cah Toa

c) $\sin(\arctan 2x)$

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

$\frac{y}{x} = \frac{2x}{1}$

$y = 2x$

$= \frac{2x^2}{\sqrt{x^2+4x^4}} = \frac{2x^2}{\sqrt{x^2}\sqrt{1+}}$

$\frac{2x^{\cancel{2}}}{\cancel{x}\sqrt{1+4x^2}}$ $\frac{\sqrt{2}}{\sqrt{1}}$

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

$b^2 \quad a^2$

Vertical.

$(0, \pm a)$

Vert: $(0, \pm\sqrt{12})$

31) $\sin x = 3/5$ Quad

Cos 2x ?

$\cos x = \frac{4}{5}$

$\sin x = 3/5$

$\cos 2x = \cos^2 x - \sin^2 x$

$\frac{16}{25} - \frac{9}{25} =$

11) $5, -2, 2-i, 2+i$

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

14a. Evaluate: $\log_2 16 = 4$

14b. Expand. $\ln \frac{5x}{\sqrt[3]{x^2+1}}$

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

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

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

20c) Solve for x

$e^{2x+1} = 9$

$\ln(e^{2x+1}) = \ln 9$

$2x+1 = \ln 9$

$x = \frac{\ln 9 - 1}{2}$

105 / 16

20e) $\ln(7-x) + \ln(3x+5) = \ln(24$

$= \ln(7-x)(3x+5) = \ln 24x$

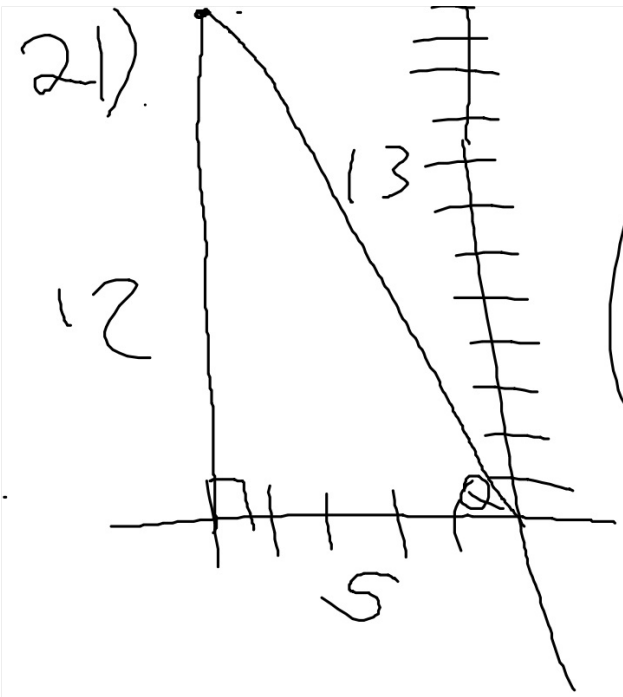
$-3x^2 + 16x + 35 = 24x$

$3x^2 + 8x - 35 = 0$

$(3x-7)(x+5) = 0$

$x = 7/3,$

21)



Soh Cah Toa.

$\text{Sine} = \frac{12}{13}$

$\text{Cosine} = \frac{5}{13}$

27. Simplify

a) $\frac{1-\cos^4 x}{1+\cos^2 x} = \frac{(1+\cos^2 x)(1-\cos^2 x)}{1+\cos^2 x} = 1-\cos^2 x = \boxed{\sin^2 x}$

b) $\sin^2 x \cot^2 x + \sin^2 x = \sin^2 x \left(\frac{\cos^2 x}{\sin^2 x}\right) + \sin^2 x$

$= \cos^2 x + \sin^2 x = \boxed{1}$

c) $\frac{1-\csc x}{\csc x} = \frac{1}{\csc x} - \frac{\csc x}{\csc x} = \boxed{\sin x - 1}$

d) $2\sin^2 x + \cos^2 x - 1 =$

$= \sin^2 x + \sin^2 x + \cos^2 x - 1 = \sin^2 x + 1 - 1 = \boxed{\sin^2 x}$

26. period, amp, shifts

a). $f(x) = \sin(2x) + 5$

per: $\frac{2\pi}{2} = \boxed{\pi}$

amp: $|1| = \boxed{1}$

up 5

b). $f(x) = \tan\left(\frac{\pi x}{2}\right) - 3$

per: $\frac{\pi}{\pi/2} = \pi \cdot \frac{2}{\pi} = \boxed{2}$.

amp: $|1| = 1$

down 3.

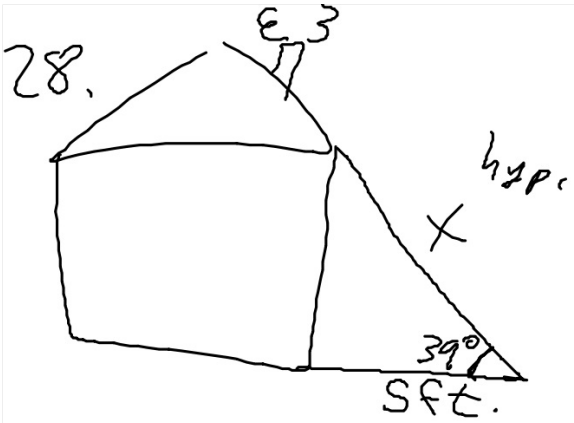
c). $-4\cos\left(\frac{x}{4} - \pi\right)$

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

Amp: $|-4| = 4$

right π

28.



∴ adj.

Soh Cah Toa.

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

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

25 $\sin x = a$, $\cos x = b$

a) $\sin(-x) = -\sin x = \boxed{-a}$

b) $\cos(-x) = \cos x = b$.

c) $\tan(-x) = -\tan x = -\frac{\sin x}{\cos x} = \boxed{-\frac{a}{b}}$.

d) $\tan x = \frac{a}{b}$

8. Find all 0's.

$f(x) = x^3 - 7x + 6$

$\frac{\pm p}{\pm q} = \frac{\pm \text{Factors of } 6}{\pm \text{factors of } 1} = \pm 1, \pm 2, \pm 3, \pm 6$

	1	0	-7	6
+		1	1	-6
	1	1	-6	0

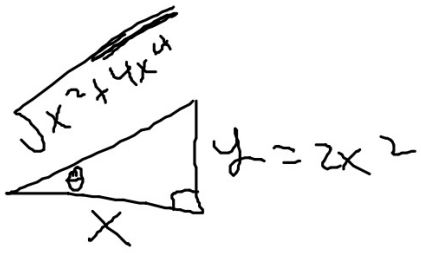
$f(x) = (x-1)(x^2+x-6)$

$= (x-1)(x-3)(x+2)$

$= \boxed{1, 3, -2}$

24. Evaluate. Soh Cah Toa. $\tan\theta =$

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



$\tan\theta = \frac{y}{x} = 2x$

$y = 2x^2$

$= \frac{2x^2}{\sqrt{x^2+4x^4}} = \frac{2x^2}{\sqrt{x^2}\sqrt{1+4x^2}}$

$= \frac{2x^2}{x\sqrt{1+4x^2}} = \frac{2x}{\sqrt{1+4x^2}}$

31) $\sin x = 3/5$, find $\cos 2x$ (Q II).

$\cos 2x = \cos^2 x - \sin^2 x$

$= 2\cos^2 x - 1$

$= 1 - 2\sin^2 x \Rightarrow 1 - 2(3/5)^2$

$= 1 - \frac{18}{25} = \boxed{\frac{7}{25}}$.

44 b) $x^2 + y^2 - 6x = 0$

$x^2 - 6x = -y^2$

$x(x-6) = -y^2$

$x(x-6) = 0$

$(0,0)$ or $(6,0)$ $\longrightarrow$ $\left(\sqrt{x^2+y^2}, \tan^{-1}(y/x)\right)$

$= (6, \tan^{-1}(0))$

$= (6, \pi)$

43a) $(-5, 5\pi/6)$ Polar → rect. $5\pi/6 + (5$

$(r, \theta) \xrightarrow{(r\cos\theta, r\sin\theta)} (x, y)$

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

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

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

44a) rect → polar

$(3, 4) \longrightarrow \left(\sqrt{x^2+y^2}, \tan^{-1}\left(\frac{y}{x}\right)\right)$

$= \left(\sqrt{16+9}, \tan^{-1}\left(\frac{4}{3}\right)\right)$

$= (5, \ldots$

10) Given that $3i$ is a root, find the remaining roots of $f(x) = x^4 - 6x^3 + 14x^2 - 54x + 45$

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

$\pm p$ / $\pm q$

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

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

$x^2+9 \;\overline{)\; x^4 - 6x^3 + 14x^2 - 54x + 45}$

$x^2 - 6x + 5$

$\ominus\ x^4 + 9x^2$

$-6x^3 + 5x^2 - 54x$

$\ominus\ -6x^3 - 54x$

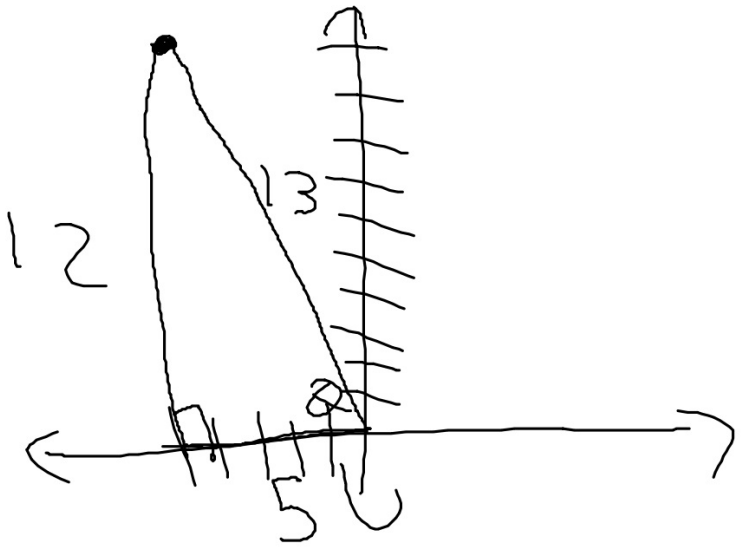
$5x^2 + 45$

$\ominus\ 5x^2 + 45$

0

$3i, -3i, 1, 5$

21) Find sin, cos of the terminal angle containing (-5, 12).



$\sin\theta = \frac{12}{13}$

$\cos\theta = \frac{5}{13}$