

1. $\int_0^{\pi} [\cos^2 \frac{\pi}{8} - \sin^2 \frac{\pi}{8}] dx$

$\int_0^{\pi} [\cos 2(\frac{\pi}{8})] dx$

$\int_0^{\pi} \cos \frac{\pi}{4} dx$

$\int_0^{\pi} \frac{\sqrt{2}}{2} dx$

$44\sqrt{2}$

2. $2(\binom{4}{1}) + 2(\binom{5}{4} - \binom{4}{4}) + 2(\binom{6}{4} - \binom{5}{4}) + 2(\binom{7}{4} - \binom{6}{4})$

$2(1) + 2(5-1) + 2(15-5) + 2 + 2(4) + 2(10) + 2(35-15) + 2 + 8 + 20 + 2(20) + 10 + 20 + 40 + 30 + 40 = 70$

4. $x + xy - 3y + 2 = 0$

$y(x-3) = -x-2$

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

$y = \frac{-(x+2)}{x-3}$

$x \neq 3$ hence

Vertical asymptote
Horizontal

$x=3$
 $y=-1$

3.

$(1000000000 - 1)(2345679)$

$$\begin{array}{r} 12345679000000000 \\ - 12345679 \\ \hline 12345678987654321 \end{array}$$

$2(1+2+\dots+8) = 2(36) = 72$
 $\frac{72}{9} = 8$
 $\sqrt{81}$

5. $y = x^2 - 6x + 9$

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

$f'(x) = 2x - 6$

$2 = 2x - 6$

$8 = 2x$

$4 = x$

$f(4) = 16 - 24 + 9 = -8 + 9 = 1$

$(4, 1)$

$y = 2x + b$

$y = x^2 - 6x + 9$

$2x + b = x^2 - 6x + 9$

$0 = x^2 - 8x + 9 - b$

$B^2 - 4AC = 0$

$64 - 4(1)(9-b) = 0$

$64 - 36 + 4b = 0$

$28 + 4b = 0$

$28 = -4b$

$-7 = b$

tangent
 $y = 2x + (-7)$

$2x - 7 = x^2 - 6x + 9$

$0 = x^2 - 8x + 16$

$0 = (x-4)^2$

$x = 4$

$f(4) = 1$

$$6. \quad \frac{3}{3} = 8 \quad \frac{360}{3} = 120$$

$$z^3 = 8 + 0i$$

$$8^{1/3} \text{Cis } 0$$

$$8^{1/3} \text{Cis } 120$$

$$8^{1/3} \text{Cis } 240$$



$$r = 8$$

$$\theta = 0$$

$$2 \text{Cis } 0 = 2(1 + i \cdot 0) = 2$$

$$2 \text{Cis } 120 = 2\left(-\frac{1}{2} + i\frac{\sqrt{3}}{2}\right) = (-1 + i\sqrt{3})$$

$$2 \text{Cis } 240 = 2\left(-\frac{1}{2} - i\frac{\sqrt{3}}{2}\right) = (-1 - i\sqrt{3})$$

$$7. \quad A: (3, -5); (5, k)$$

$$\perp = A \cdot B = 0$$

$$3(5) + -5k = 0$$

$$-5k = -15$$

$$k = 3$$

$$B: (5, 3)$$

$$B: (k, -1); (5, -10)$$

$$\frac{5}{10} = \frac{1}{2} \quad \frac{-10}{10} = -1$$

$$W = \left(\frac{1}{2}, -1\right)$$

$$V \cdot W = \frac{5}{2} + 3(-1)$$

$$= \frac{5}{2} + \frac{-6}{2}$$

$$= -\frac{1}{2}$$

$$8. \quad \frac{\sin 2x}{\cos x} - \frac{\cos 2x}{\cos x}$$

$$\frac{2 \sin x \cos x}{\cos x} - \frac{(-1 + 2 \cos^2 x)}{\cos x}$$

$$2 \cos x - \frac{(2 \cos^2 x - 1)}{\cos x}$$

$$\frac{2 \cos^2 x - 2 \cos^2 x + 1}{\cos x}$$

$$\frac{0 + 1}{\cos x}$$

$$\sec x$$

$$10. \quad (x^3 - 4y)^{4/3} = (x^{1/3} - 4y^{1/3})^4$$

$$(x^{-8} \cdot 256 \cdot y^4)^{4/3} = \frac{4!}{3!} \cdot \frac{-8! \cdot 4!}{3! \cdot 2! \cdot 1!} = \frac{5}{243} \cdot \frac{-8! \cdot 4!}{4 \cdot 3 \cdot 2 \cdot 1} = \frac{-5}{243}$$

$$\frac{1280}{243} x^{-8} y^4$$

$$\frac{9\sqrt{3} + 8\sqrt{2}}{-23} =$$

$$9. \quad \left(2, \frac{\pi}{3}\right)$$

$$\sin x + \sqrt{3} \cos x = a[\sin(x+b)]$$

$$\sin x + \sqrt{3} \cos x = a[\sin x \cos b + \cos x \sin b]$$

$$\sin x [1 - a \cos b] = \cos x [a \sin b - \sqrt{3}]$$

for all x to be true

$$1 - a \cos b = 0$$

hence

$$\cos b = \frac{\sqrt{a^2 - 3}}{a}$$

$$1 - a \cdot \frac{\sqrt{a^2 - 3}}{a} = 0$$

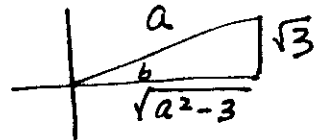
$$1 = \frac{a^2 - 3}{a^2}$$

$$4 = a^2$$

$$\pm 2 = a$$

$$\text{and } a \sin b - \sqrt{3} = 0$$

$$\sin b = \frac{\sqrt{3}}{a}$$

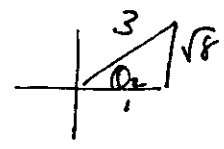
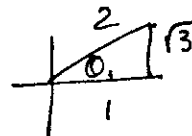


$$a > 0$$

$$a = 2$$

$$b = \frac{\pi}{3}$$

$$11. \quad \tan [\text{Arcsec } 2 + \text{Arcsec } 3]$$



$$\tan [\theta_1 + \theta_2] = \frac{\tan \theta_1 + \tan \theta_2}{1 - \tan \theta_1 \tan \theta_2}$$

$$\frac{\sqrt{3} + \sqrt{8}}{1 - \sqrt{3} \cdot \sqrt{8}} = \frac{\sqrt{3} + 2\sqrt{2}}{1 - 2\sqrt{6}} = \frac{\sqrt{3} + 2\sqrt{2}}{1 - 2\sqrt{6}} = \frac{\sqrt{3} + 2\sqrt{2}}{1 - 4 \cdot 6}$$

$$12. \dots 10e^{-x} + e^{5x} = 7e^{2x}$$

$$10 + e^{4x} - 7e^{2x} = 0$$

$$e^{4x} - 7e^{2x} + 10 = 0$$

$$y^4 - 7y^2 + 10 = 0$$

$$(y^2 - 5)(y^2 - 2) = 0$$

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

$$e^{2x} = 2$$

$$2x \ln e = \ln 5$$

$$2x \ln e = \ln 2$$

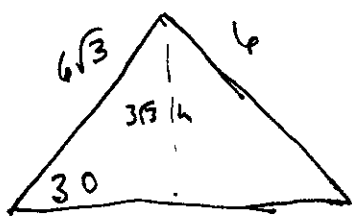
$$2x = \ln 5$$

$$2x = \ln 2$$

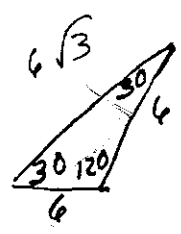
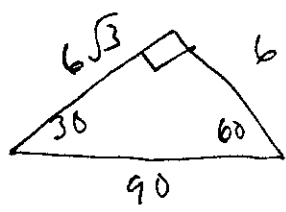
$$x = \frac{\ln 5}{2}$$

$$x = \frac{\ln 2}{2}$$

13.



$$\sin 30 = \frac{h}{6\sqrt{3}} = 6\sqrt{3} \sin 30 = 6\sqrt{3} \cdot \frac{1}{2} = 3\sqrt{3}$$



$$\frac{1}{2} \cdot 6\sqrt{3} \cdot 6$$

$$\frac{1}{2} \cdot 6 \cdot 6 \cdot \sin 120$$

$$3\sqrt{3} \cdot 6$$

$$18 \cdot \frac{\sqrt{3}}{2}$$

$$18\sqrt{3}$$

$$9\sqrt{3}$$

$$\frac{18\sqrt{3}}{9\sqrt{3}} = \frac{2}{1} \text{ or } \frac{1}{2} =$$

$$\boxed{\begin{matrix} 2:1 \\ \text{or} \\ 1:2 \end{matrix}}$$

$$14. \tan x \sec x = \tan x$$

$$\tan x (\sec x - 1) = 0$$

$$\tan x = 0$$

$$\sec x = 1$$

$$x = 0 \text{ X}$$

$$x = 0 \text{ X}$$

$$180$$

$$360 \text{ X}$$

$$360 \text{ X}$$

$$0 < 0 < 36$$

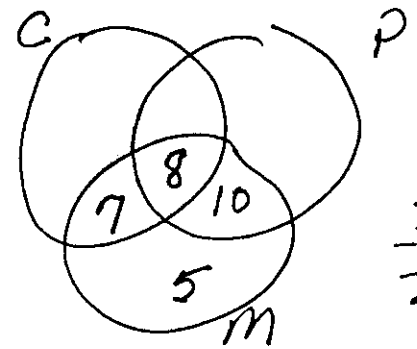
$$\text{hence } \boxed{180}$$

$$15. 30 = \text{math}$$

$$15 = C$$

$$18 = P$$

$$8 = C + P$$



$$\begin{array}{r} 15 \\ - 18 \\ \hline -3 \\ - 8 \\ \hline -25 \end{array} \quad \begin{array}{r} 30 \\ - 35 \\ \hline -5 \end{array}$$

$$P(\sim C \text{ or } \sim P) = P(M) = \frac{5}{30}$$

$$\boxed{\frac{1}{6}}$$