① $x^3 + 3x^2 - 10x = 0$

$x(x^2 + 3x - 10) = 0$

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

$x = 0, -5, +2$

② $x(3x+10) = 77$

$3x^2 + 10x - 77 = 0$

$(3x - 11)(x + 7) = 0$

$3x - 11 = 0 \qquad x + 7 = 0$

$x = \frac{11}{3} \qquad x = -7$

③ $|2x+5| < 4$

$2x + 5 < 4$ and $(2x+5) > -4$

$-4 < 2x + 5 < 4$

$-\frac{9}{2} < x < \frac{-1}{2}$

④ $y = x^2$ and $y = 6x - x^2$

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

$2x^2 - 6x = 0$

$x(2x - 6) = 0$

$x = 0 \qquad 2x - 6 = 0$

$x = \frac{6}{2} = 3$

⑤ $y = x - 2x^2$ and $y = -5x$

$x - 2x^2 = -5x$

$0 = 2x^2 - 6x$ same as 4. //

6. $x(\sqrt{x} + \sqrt[3]{x})$

$= x(x^{1/2} + x^{1/3})$

$= x^{1\frac{1}{2}} + x^{1\frac{1}{3}}$

$= x^{3/2} + x^{4/3}$ ← Preferred

$\sqrt{x^3} + \sqrt[3]{x^4}$

$= x\sqrt{x} + x\sqrt[3]{x}$

7. $\dfrac{3x^2 - 4\sqrt[3]{x} + x}{\sqrt{x}}$ $\quad \frac{1}{3} - \frac{1}{2} = \frac{2-3}{6} = -\frac{1}{6}$

$= \dfrac{3x^2}{x^{1/2}} - \dfrac{4x^{1/3}}{x^{1/2}} + \dfrac{x^1}{x^{1/2}}$

$= 3x^{1\frac{1}{2}} - 4x^{-\frac{1}{6}} + x^{1/2}$

$= 3x^{3/2} - \dfrac{4}{x^{1/6}} x^{5/6} + x^{1/2}$

$\dfrac{3\sqrt{x^3} - 4x^{5/6}}{x} + x^{1/2}$

8. $\dfrac{x^3 - 8}{x^3 + 8} = \dfrac{(x-2)(x^2+2x+4)}{(x+2)(x^2-2x+4)} =$

↓ it is

9. $\dfrac{2x^2 + x - 6}{x^2 + 3x + 2} \Rightarrow \dfrac{(x+2)(2x-3)}{(x+2)(x+1)} \Rightarrow \dfrac{2x-3}{x+1}$

10. $8^{2/3} \Rightarrow (2^3)^{\frac{2}{3}} = 2^2 = 4$

(11) $\sqrt{4^5} = \sqrt{4^2 \cdot 4^2 \cdot 4^1}$

$= 4 \cdot 4 \cdot 2$

$= \boxed{32}$

(12) $32^{\frac{2}{5}}$

$= (2^5)^{\frac{2}{5}}$

$= 2^{5 \cdot \frac{2}{5}}$

$= \boxed{4}$

(13) $\ln e^{-100} = -100$

(14) $e^{\ln 15} = 15$

(15) $\log_{16} 4 = y$

$16^y = 4$

$(4^2)^y = 4^1$

$2y = 1$

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

(16) $e^{3 \cdot \ln 2}$

$= (e^{\ln 2})^3$

$= 2^3$

$= 8$

(17) $\ln 1 = y$

$e^y = 1$

$y = 0$

(18) $2 \cdot \ln 4 - \ln 2$

$= \ln 4^2 - \ln 2$

$= \ln \frac{4^2}{2}$

$= \ln 8$

(19) $\frac{1}{2} \cdot \ln x - 5 \cdot \ln (x^2+1)$

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

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

(20) $\ln 3 + \frac{1}{3} \ln 8$

$\ln 3 + \ln 8^{\frac{1}{3}}$

$\ln 3 + \ln 2$

$= \ln 3 \cdot 2$

$\ln 6$

(21) $2 \ln x = 1$

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

$e^{\frac{1}{2}} = x$

$\sqrt{e} = x$

(22) $5^{x-3} = 25$

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

$x - 3 = 2$

$x = 5$

(23) $2 \cdot \ln x = \ln 2 + \ln(3x-4)$

$\ln x^2 = \ln[2 \cdot (3x-4)]$

$x^2 = 2(3x-4)$

$x^2 = 6x - 8$

$x^2 - 6x + 8 = 0$

$(x-2)(x-4) = 0$

$\Rightarrow x = 2, 4$

(24) $y = mx + b$?

$(3,4)$ $(2,-6)$

$m = \frac{4 - -6}{3-2} = \frac{10}{1}$

$y = 10x + b$

$4 = 10(3) + b$

$4 = 30 + b$

$4 - 30 = b$

$-26 = b$

$y = 10x - 26$

(25) x int = 7 (4, 10)

(7, 0) (4, 10)

$m = \frac{10-0}{4-7} = \frac{10}{-3}$

$y = -\frac{10}{3}x + b$

$10 = \frac{-10(4)}{3} + b$

$(\frac{3}{3})\ 10 + \frac{40}{3} = b$

$\frac{70}{3} = b$

$y = -\frac{10}{3}x + \frac{70}{3}$

(26) $m = ?$

(A) given $2x - 5y = 9$

$2x - 9 = 5y$

$\frac{2}{5}x - \frac{9}{5} = y$

$\therefore m = \frac{2}{5}$

(B) (3, -4) // $\therefore m = 2/5$

$y = mx + b$

$-4 = \frac{2}{5}(3) + b$

$-4 = \frac{6}{5} + b$

$-\frac{4}{5} - \frac{1}{5} = b$

$\frac{-26}{5} = b$ $\therefore$ $y = \frac{2}{5}x - \frac{26}{5}$

26 C

(3, -4) "⊥" to part A

$m_{\perp} = -\frac{5}{2}$

$y = -\frac{5}{2}x + b$

$-4 = -\frac{5}{2}(3) + b$

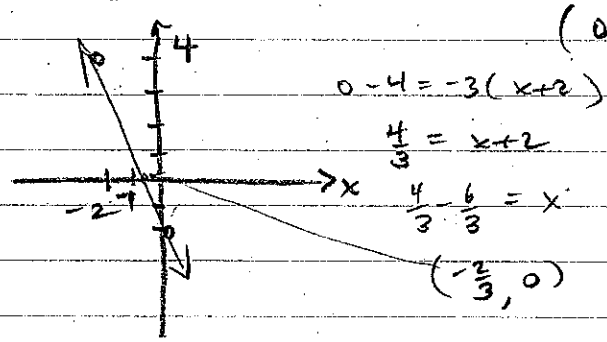
$-4 = -\frac{15}{2} + b$

$-\frac{4}{2} + \frac{15}{2} = +b$

$\frac{7}{2} = b$ $\quad y = -\frac{5}{2}x + \frac{7}{2}$

27 $y - 4 = -3(x+2)$ $\quad (-2, 4)$ & $m = -3$

$(0, -2)$



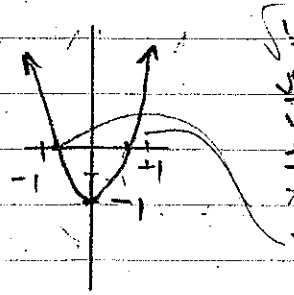
$0 - 4 = -3(x+2)$

$\frac{4}{3} = x + 2$

$\frac{4}{3} - \frac{6}{3} = x$

$(-\frac{2}{3}, 0)$

28 $y = 2x^2 - 1$ $\quad 0 = 2x^2 - 1$



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

$\frac{\sqrt{1}}{\sqrt{2}}$

$\pm\frac{\sqrt{2}}{2} = x$

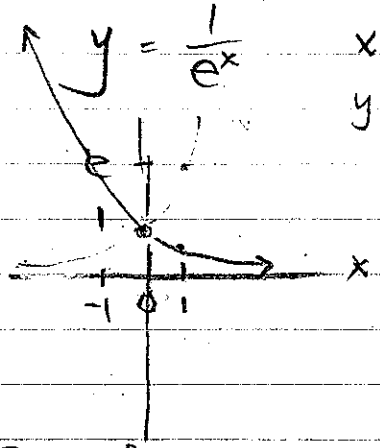
$\pm .707 \approx x$

(29) $y = e^{-x}$

$= (e^x)^{-1}$

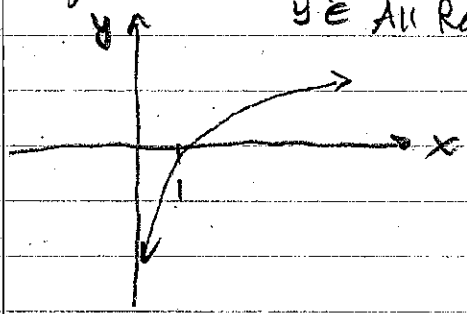
$y = \frac{1}{e^x}$ $\quad x \in$ Reals

$y \geq 0$



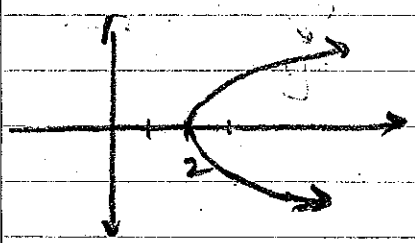
(30) $y = \ln x$ $\quad x \geq 0$

$y \in$ All Reals



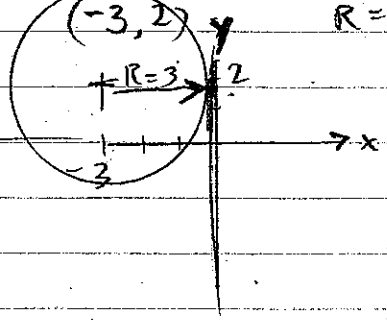
(31) $x = 4y^2 + 2$ $\quad x \geq 2$

$y \in$ Reals

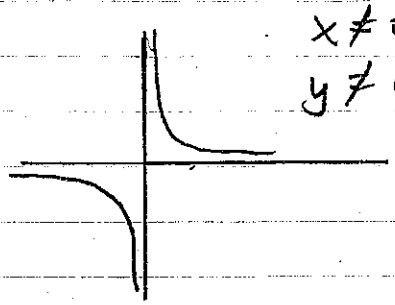


(32) $(x+3)^2 + (y-2)^2 = 9$

$R = 3$

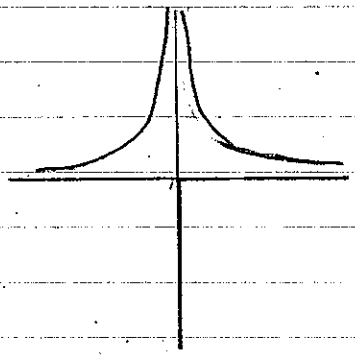


(33) $y = 1/x$

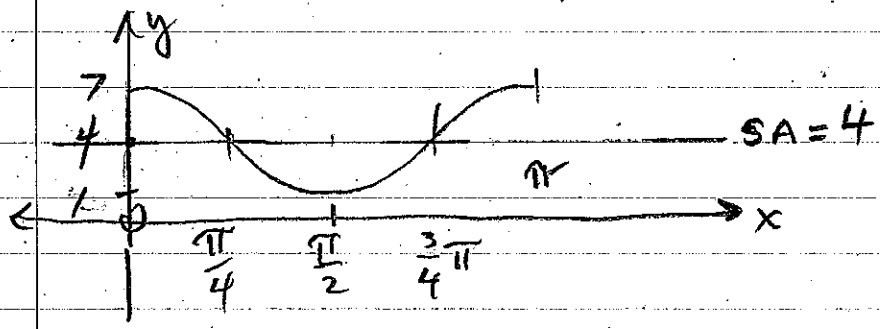


$x \neq 0$
$y \neq 0$

(34) $y = \frac{1}{x^2}$

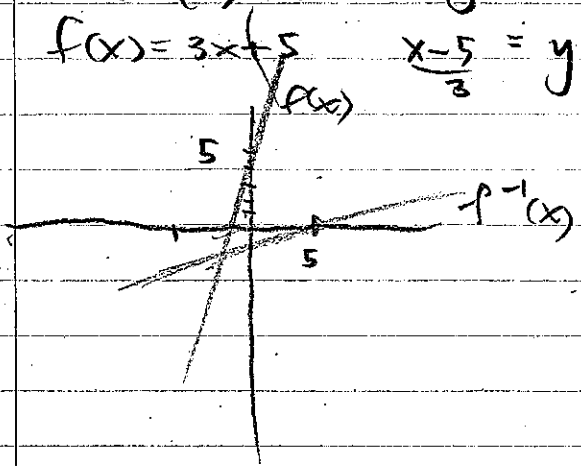


(35) $y = 4 + 3 \cdot \cos 2x$ 2 in 2π

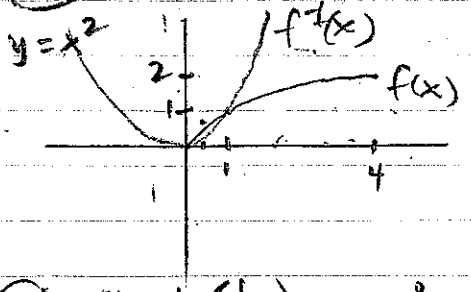


(36) $f^{-1}(x) \Rightarrow x = 3y + 5$

$f(x) = 3x + 5$ $\quad \frac{x-5}{3} = y = f^{-1}(x)$



(36B) $f(x) = \sqrt{x}$ $x \geq 0$ $f^{-1}(x)$ $y \geq 0$



$x = \sqrt{y}$ $x \in$ Real

$x^2 = y$

(37) $\sin^{-1}\left(\frac{1}{2}\right) = 30^\circ$

$= \pi/3$

(38) $\cos^{-1}\left(-\sqrt{3}/2\right) = 150^\circ$

$= \frac{5}{6}\pi$

(39) $\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) = -45^\circ$

$= \frac{-\pi}{4}$

(40) $2 \cdot \cos 2\theta - \sqrt{3} = 0$ All solns

$\cos 2\theta = \frac{-\sqrt{3}}{2}$

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

$2\theta = \pm 150 + 360n$ or $2\theta = \pm \frac{5}{6}\pi + 2\pi n$

$\theta = \pm 75 + 180n$ or $\theta = \pm \frac{5}{12}\pi + \pi n$

(41) $2 \cdot \sin 3\theta + \sqrt{2} = 0$

$\sin 3\theta = \frac{-\sqrt{2}}{2}$

$3\theta = \sin^{-1}\left(\frac{-\sqrt{2}}{2}\right)$ or $3\theta = \left(180 - \sin^{-1}\left(\frac{-\sqrt{2}}{2}\right)\right) + 360n$

$3\theta = -45^\circ + 360n$ or $\theta = 60 - 15^\circ = 45^\circ + 120n$

$\theta = -15^\circ + 120n$ or

$\theta = \frac{-\pi}{12} + \frac{2}{3}\pi n$ or $\theta = \frac{\pi}{4} + \frac{2}{3}\pi n$

Quad Program in TiB3 = ? ? ?