Solutions

1) $\frac{-4-5}{|-5+3|} = \frac{-9}{|-2|} = \boxed{-\frac{9}{2}}$

2) $-\frac{2}{3}x - \frac{8}{3} = 6 + x$

$-\frac{2}{3}x - \frac{3}{3}x = \frac{18}{3} + \frac{8}{3}$

$-\frac{5}{3}x = \frac{26}{3} \quad \cdot \frac{3}{-5}$

$\boxed{x = -\frac{26}{5}}$

3) $\frac{1}{2}x - \frac{1}{3}x + \frac{1}{3} = \frac{1}{6}x + 5$

$\frac{3}{6}x - \frac{2}{6}x - \frac{1}{6}x = \frac{15}{3} - \frac{1}{3}$

$0 = \frac{14}{3}$

$\boxed{\text{no solution}}$

4) $aK = bK + b$

$(a-b)K = b$

$\boxed{K = \frac{b}{a-b}} \quad a \neq b$

5) $x^2 = 9 \quad \boxed{x = \pm 3}$

6) $x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$\boxed{x = 4,\ x = -1}$

7) $x^2 + 4x + 4 = 0$

$(x+2)^2 = 0$

$\boxed{x = -2}$

8) $|x-10| < 5$

$-5 < x - 10 < 5$

$+10 \quad +10 \quad +10$

$\boxed{5 < x < 15}$

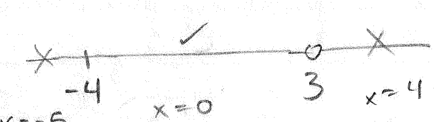
9) $(e^{5x}+3)(e^{5x}+3)$

$\boxed{e^{10x} + 6e^{5x} + 9}$

10) $\boxed{64x^{12}y^2}$

11) $\boxed{\frac{-2x^2}{y^4}}$

12) $x \neq 3$



$\frac{0+4}{3-0} > 0$ ✓

$\frac{4+1}{3-4} \not> 0$

$\boxed{x \in (-4, 3)}$

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

$\ln(2 \cdot x^{10}) - \ln(y)^{\frac{1}{2}}$

$\boxed{\ln\left(\frac{2x^{10}}{\sqrt{y}}\right)}$

15) $\frac{13}{(x-2)(x+2)} = \frac{2(x+2)}{(x-2)(x+2)} - \frac{3(x-2)}{(x+2)(x-2)}$

$13 = 2x + 4 - 3x + 6$

$3 = -x \quad \Rightarrow \boxed{x = -3}$

14) $\boxed{\frac{3}{2}\ln x + 2\ln y - \ln\sqrt{3z}}$

16) $-((49)^{\frac{1}{2}})^3 = -(7)^3 = \boxed{-343}$

17) $\boxed{\text{undefined}}$ - can't take $\sqrt{\ }$ of a negative #

18) $\boxed{-2}$

19) $\frac{2^{1/2} \cdot 2^n}{2^2} = \boxed{2^{n-\frac{3}{2}}}$

20) $\frac{1}{x(x-3)} + \frac{2x}{(x+3)(x-3)} = \frac{(x+3)}{x(x-3)(x+3)} + \frac{2x(x)}{x(x+3)(x-3)}$

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

21) $\frac{y(x+y)}{x(x-y)(x+y)} - \frac{y\,x}{(x-y)(x+y)\,x} = \frac{xy+y^2}{x(x-y)(x+y)} - \frac{xy}{x(x-y)(x+y)}$

$$\boxed{= \frac{y^2}{x(x^2-y^2)}}$$

22) $\dfrac{\frac{x^2+1}{\frac{x-1}{x}} - \frac{x^2+1}{\frac{x+1}{x}}}{\frac{x^2+1}{x}} = \left(\frac{\cancel{x^2+1}}{1}\cdot\frac{x}{x-1} - \frac{\cancel{x^2+1}}{1}\cdot\frac{x}{x+1}\right)\cdot\frac{x}{\cancel{x^2+1}}$

$= \left[\frac{x}{x-1} - \frac{x}{x+1}\right]x = \left(\frac{x(x+1)}{(x-1)(x+1)} - \frac{x(x-1)}{(x-1)(x+1)}\right)x$

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

23) $e^{\ln 2}\cdot e^{\ln\frac{1}{2}} = 2\cdot\frac{1}{2} = \boxed{1}$

24) $y = \frac{x}{x-1}+1$

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

$xy-x-y+1 = x$

$xy-2x = y-1$

$x(y-2) = y-1$

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

25) $x^2 - x - 2 \geq 0$

$(x-2)(x+1) \geq 0$

$x=-2$ $x=0$ $x=3$

-1 2

$\boxed{x \in (-\infty,-1)\cup(2,\infty)}$

in denomenator so cant =

26) $m = \frac{\Delta y}{\Delta x} = \frac{1-3}{-13} = \frac{2}{13}$

$3 = \frac{2}{13}(2)+b \Rightarrow b = \frac{39}{13} - \frac{4}{13} = \frac{35}{13}$

$\boxed{y = \frac{2}{13}x + \frac{35}{13}}$

27) $2x+5y=7$

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

$-y=15$

$y=-15$

$x=-4-3(-15)=41$

$\boxed{\begin{matrix}x=41\\ y=-15\end{matrix}}$

28) $\frac{(-3)^{\overset{3}{\cancel{5}}}x^{10}y^{-7}}{\cancel{-9}\,x^3y^6} = \boxed{\frac{3^3x^7}{y^{13}} = \frac{27x^7}{y^{13}}}$

29) $4x^{\overset{4/6}{2/3}}y^{4/5}(-3)^2y^{-6/5}x^{-1/6}$

$= 36x^{3/6}y^{-2/5} = \boxed{\frac{36x^{1/2}}{y^{2/5}}}$

30) $\dfrac{x\cancel{(x-2)}}{\cancel{(x+2)}\cancel{(x-2)}} \cdot \dfrac{\cancel{(x-3)}\cancel{(x+2)}}{x^2\cancel{(x-3)}} = \boxed{\dfrac{1}{x}}$

31) $\dfrac{a^2(a-2b)}{a(a^2-4b^2)} \cdot \dfrac{(a-b)(a+2b)}{a^3(a+3b)} = \dfrac{a^2\cancel{(a-2b)}}{a\cancel{(a-2b)}\cancel{(a+2b)}} \cdot \dfrac{(a-b)\cancel{(a+2b)}}{a\cancel{a^3}(a+3b)}$

$\boxed{= \dfrac{a-b}{a^2(a+3b)}}$

32) $\dfrac{(6\cdot\cancel{5\cdot4\cdot3\cdot2\cdot1})(3\cdot2\cdot1)}{(\cancel{5\cdot4\cdot3\cdot2\cdot1})(1)} = 6\cdot6 = \boxed{36}$

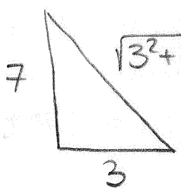
33) $\dfrac{[\cancel{(n+1)(n)(n-1)\cdots1}][\cancel{(n-1)(n-2)\cdots1}]}{[\cancel{n(n-1)\cdots1}]\ [(n+2)\cancel{(n+1)}(n)\cancel{(n-1)\cdots1}]} = \boxed{\dfrac{1}{(n+2)(n)}}$

34) $x^2-4x+\underline{4}+y^2+6y+\underline{9}=12+4+9$

$(x-2)^2+(y+3)^2=25$ $\boxed{\begin{array}{l}\text{center } (2,-3)\\ \text{radius } 5\end{array}}$

35) $\dfrac{\dfrac{1}{\cancel{\cos x}} \cdot \cancel{\cos^2 x} \cdot \dfrac{\sin x}{\cos x}}{\cancel{\sin x} \cdot \dfrac{\cos^2 x}{\sin^2 x} \cdot \dfrac{1}{\sin^3 x}} = \dfrac{\sin x}{1} \cdot \dfrac{\sin^4 x}{\cos^2 x} = \boxed{\dfrac{\sin^5 x}{\cos^2 x}}$

36)



$\sqrt{3^2+7^2} = \boxed{\sqrt{58}}$

37) $\tan^{-1}(1) = \boxed{\dfrac{\pi}{4}}$

38) $\tan^{-1}(\sqrt{3}) = \boxed{\dfrac{\pi}{3}}$

$\dfrac{\sin}{\cos}$ $\sqrt{3} = \dfrac{\frac{\sqrt{3}}{2}}{\frac{1}{2}}$

39) next page

40) $\lim\limits_{x\to0} \dfrac{\sin(3x)-\sin(5x)}{\sin(2x)} = \dfrac{0}{0} \Rightarrow \lim\limits_{x\to0} \dfrac{3\cos(3x)-5\cos(5x)}{2\cos(2x)} = \dfrac{3-5}{2} = \boxed{-1}$

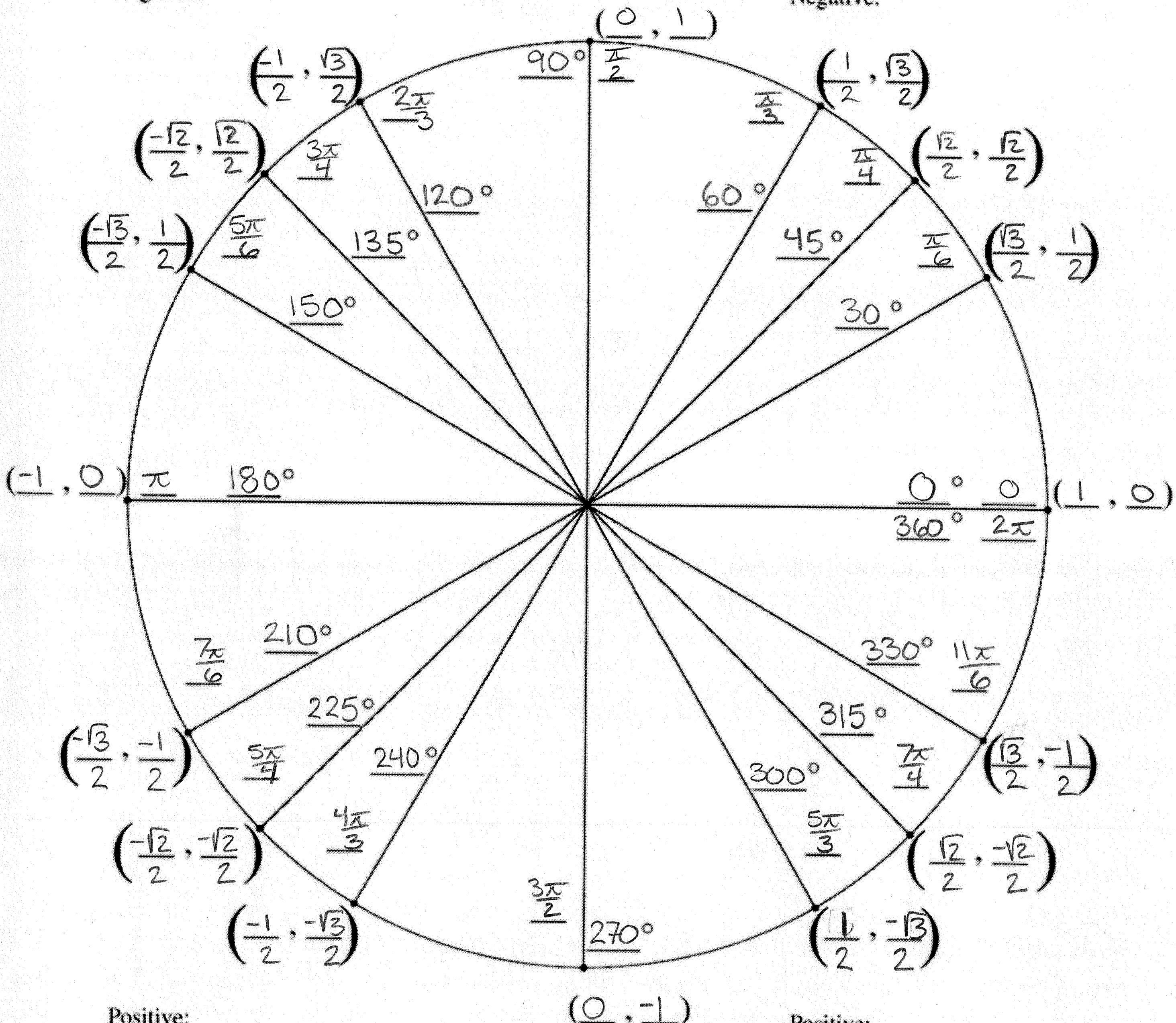
41) $\lim\limits_{x\to\infty} \dfrac{4x+\sqrt{x^2+1}}{3x+7} = \dfrac{\infty}{\infty} \Rightarrow \lim\limits_{x\to\infty} \dfrac{4+\dfrac{2x}{2\sqrt{x^2+1}}}{3} = \dfrac{4}{3} + \lim\limits_{x\to\infty} \dfrac{x}{3\sqrt{x^2+1}} = \dfrac{\infty}{\infty}$

$= \dfrac{4}{3} + \lim\limits_{x\to\infty} \dfrac{x\,\dfrac{1}{\sqrt{x^2}}}{\dfrac{3\sqrt{x^2+1}}{\sqrt{x^2}}} = \dfrac{4}{3} + \lim\limits_{x\to\infty} \dfrac{1}{3\sqrt{1+\frac{1}{x^2}}} = \dfrac{4}{3}+\dfrac{1}{3} = \boxed{\dfrac{5}{3}}$

Fill in The Unit Circle

Positive:
Negative:

Positive:
Negative:



Positive:
Negative:

Positive:
Negative:

EmbeddedMath.com

42) $\lim_{h\to 0} \dfrac{(x+h)^{50}-x^{50}}{h} = \dfrac{0}{0} \Rightarrow \lim_{h\to 0} \dfrac{50(x+h)^{49}-0}{1} = \boxed{50x^{49}}$

43) $\lim_{n\to\infty} \dfrac{\cancel{n(n-1)\cdots 1}}{(n+1)\cancel{(n)(n-1)\cdots 1}} = \boxed{0}$

44) $\lim_{n\to\infty} \dfrac{\cancel{3^n}(n^5-16)}{\cancel{3^n}\cdot 3^2(n^4-n^5)}$ same powers take coeff in front of biggest $\boxed{\dfrac{1}{-9}}$

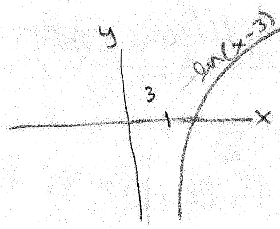
45) $\lim_{x\to 4} \dfrac{\cancel{(x-4)}(x+1)}{(x+4)\cancel{(x-4)}} = \boxed{\dfrac{5}{8}}$

46) $\lim_{x\to 4^+} \sqrt{16-x^2}$ $\boxed{\text{does not exist}}$

47) $\lim_{x\to 4^-} \dfrac{1}{\sqrt{16-x^2}} = \boxed{\infty}$

48) $\lim_{x\to 2} \dfrac{x^2-4}{\frac{1}{5}-\frac{1}{x+3}} = \dfrac{0}{\frac{1}{5}-\frac{1}{5}} \Rightarrow \lim_{x\to 2} \dfrac{x^2-4}{\frac{x+3-5}{5(x+3)}} = \lim_{x\to 2} \dfrac{5(x+3)(x^2-4)}{x-2} = \dfrac{0}{0}$

$\lim_{x\to 2} \dfrac{5(x^3+3x^2-4x-12)}{x-2} \xrightarrow{\text{L'Hopitals}} \lim_{x\to 2} \dfrac{5(3x^2+6x-4)}{1} = 5(12+12-4) = \boxed{100}$

49) 

$\lim_{x\to 3^+} \ln(x-3) = \boxed{-\infty}$

50) $\lim_{x\to 3^-} \ln(x-3) \Rightarrow$ $\boxed{\text{does not exist}}$

51) $\lim_{x\to 3} \ln(x-3)$ $\boxed{\text{does not exist}}$

52) $\int_1^3 x^2\,dx = \dfrac{x^3}{3}\Big|_1^3 = 9-\dfrac{1}{3} = \boxed{\dfrac{26}{3}}$

53) $\int_0^1 e^{3x}\,dx = \dfrac{e^{3x}}{3}\Big|_0^1 = \boxed{\dfrac{e^3-1}{3}}$

54) $\int_0^2 x^2 e^{x^3}\,dx$ $\quad u = x^3$, $du = 3x^2\,dx$ $\quad \int \frac{1}{3}e^u\,du = \frac{1}{3}e^u$

$= \dfrac{1}{3}e^{x^3}\Big|_0^2 = \boxed{\dfrac{e^8-1}{3}}$

55) $\int \frac{1}{y}\,dy = \boxed{\ln|y| + C}$

56) $\int \frac{1}{y^2}\,dy = \int y^{-2}\,dy = \boxed{-\frac{1}{y} + C}$

57) $\int \frac{1}{2-x}\,dx \boxed{= -\ln|2-x| + C}$

58) $\int \frac{x}{2-x^2}\,dx$ $\quad u = 2 - x^2$, $\quad du = -2x\,dx$ $\quad \int -\frac{1}{2}\frac{1}{u}\,du = -\frac{1}{2}\ln|u|$

$= \boxed{-\frac{1}{2}\ln|2-x^2| + C}$

59) $\int \frac{1}{x^2+1}\,dx = \boxed{\tan^{-1}x + C}$

60) $\int \frac{1}{2\left(1+\left(\frac{x}{\sqrt{2}}\right)^2\right)}\,dx$ $\quad u = \frac{x}{\sqrt{2}}$, $\quad du = \frac{1}{\sqrt{2}}\,dx$ $\quad \frac{1}{2}\int \frac{\sqrt{2}}{1+u^2}\,du = \frac{\sqrt{2}}{2}\tan^{-1}u$

$= \boxed{\frac{\sqrt{2}}{2}\tan^{-1}\left(\frac{x}{\sqrt{2}}\right) + C}$

61) $\int \left(e^{4x} + 2e^{5x} + e^{6x}\right)dx = \boxed{\frac{e^{4x}}{4} + \frac{2e^{5x}}{5} + \frac{e^{6x}}{6} + C}$

62) $\int \frac{7x}{1+x^2} + \frac{3}{1+x^2}\,dx$ $\quad u = 1 + x^2$, $\quad du = 2x\,dx$ $\quad \int \frac{7}{2}\frac{1}{u}\,du = \frac{7}{2}\ln|u|$

$\boxed{= \frac{7}{2}\ln|1+x^2| + 3\tan^{-1}x + C}$

63) $\int \frac{2x+3}{(x+1)^4}\,dx$ $\quad u = x+1 \Rightarrow x = u-1$

$\int \frac{2(u-1)+3}{u^4}\,du = \int \frac{2u+1}{u^4}\,du = \int 2u^{-3} + u^{-4}\,du$

$= \frac{2u^{-2}}{-2} + \frac{u^{-3}}{-3}$

$\boxed{= -\frac{1}{(x+1)^2} - \frac{1}{3(x+1)^3} + C}$

64) $\int \frac{e^{2x}}{1+e^{2x}}\,dx$ $\quad u = 1 + e^{2x}$, $\quad du = 2e^{2x}\,dx$ $\quad \int \frac{1}{2}\frac{1}{u}\,du = \frac{1}{2}\ln|u|$

$\boxed{= \frac{1}{2}\ln|1+e^{2x}| + C}$

65) $\int \frac{(3\ln x)^2+1}{x}\,dx$ $\quad u = 3\ln x$, $du = \frac{3}{x}\,dx$ $\quad \int \frac{1}{3} u^2\,du + \int \frac{1}{x}\,dx$

$\frac{1}{3}\frac{u^3}{3} + \ln|x|$

$$= \frac{(3\ln x)^3}{9} + \ln|x| + C = \boxed{3\ln^3(x) + \ln|x| + C}$$

66) $\int \cos x \sin x\,dx$ $\quad u = \sin x$, $du = \cos x\,dx$ $\quad \int u\,du = \frac{u^2}{2}$

$$= \boxed{\frac{\sin^2 x}{2} + C}$$

67) $\int \frac{\cos x\,dx}{\sin^2 x + 2\sin x + 1}$ $\quad u = \sin x$, $du = \cos x\,dx$

$$\int \frac{du}{u^2+2u+1} = \int \frac{du}{(u+1)^2} = \int (u+1)^{-2}\,du$$

$$= \frac{(u+1)^{-1}}{-1}$$

$$= \boxed{-\frac{1}{\sin x + 1} + C}$$

68) $\int \frac{x^2+x}{(2-3x^2-2x^3)^{1/3}}\,dx$ $\quad u = 2-3x^2-2x^3$, $du = -6x - 6x^2\,dx = -6(x+x^2)\,dx$ $\quad -\frac{1}{6}\int u^{-1/3} = -\frac{1}{\cancel{6}_2}\cdot\frac{\cancel{3}}{2}u^{2/3}$

$$\boxed{= -\frac{1}{4}(2-3x^2-2x^3)^{2/3} + C}$$

69) $\int \sec x \tan x\,dx = \boxed{\sec x + C}$

70) $\int \frac{(\sec x^{1/3})^2}{x^{2/3}}\,dx$ $\quad u = x^{1/3}$, $du = \frac{1}{3}x^{-2/3}\,dx$ $\quad \int 3\sec^2 u\,du = 3\tan u$

$$= \boxed{3\tan(x^{1/3}) + C}$$

71) $\int_0^{182} 12 + \sin\left(\frac{\pi}{182}t\right)dt = \left. 12t - \frac{\cos\left(\frac{\pi}{182}t\right)}{\pi/182}\right|_0^{182}$

$$= 12(182) - \frac{182}{\pi}\underbrace{\cos(\pi)}_{=-1} - 0 + \frac{182}{\pi}\underbrace{\cos(0)}_{=1}$$

$$= 12(182) + \frac{2(182)}{\pi}$$

$$\boxed{= 182\left(12 + \frac{2}{\pi}\right)}$$

72) $\int_0^1 \frac{x\ln(x^2+1)}{1+x^2}\,dx$ $\quad u = x^2+1$, $du = 2x\,dx$

$\int \frac{1}{2}\frac{\ln u}{u}\,du$ $\quad v = \ln u$, $dv = \frac{1}{u}du$ $\quad \int \frac{1}{2} v\,dv$

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

$\frac{(\ln(x^2+1))^2}{4}\Big|_0^1 \Leftarrow \frac{(\ln u)^2}{4} \Leftarrow$

$= \boxed{\frac{\ln^2(2)}{4}}$

73) $\int (x+1)e^{(x^2+2x+5)}\,dx$ $\quad u = x^2+2x+5$, $du = (2x+2)\,dx = 2(x+1)\,dx$ $\quad \int \frac{1}{2}e^u\,du = \frac{1}{2}e^u$

$= \boxed{\frac{1}{2}e^{x^2+2x+5} + C}$

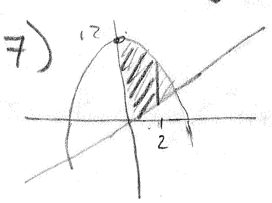
74) $\int \frac{1}{e^{2x}\sqrt{1-e^{-2x}}}\,dx \cdot \frac{e^{-2x}}{e^{-2x}} = \int \frac{e^{-2x}}{\sqrt{1-e^{-2x}}}\,dx$ $\quad u = 1-e^{-2x}$, $du = 2e^{-2x}\,dx$

$\int \frac{1}{2}\frac{du}{\sqrt{u}} = \int \frac{1}{2}u^{-1/2}\,du = \frac{1}{2}\cdot 2u^{1/2}$

$= \boxed{\sqrt{1-e^{-2x}} + C}$

75) It makes no sense for dy to be in a denomenator.

76) $\frac{d(\ln y)}{dy} = \frac{1}{y}$ not the integral

77) 

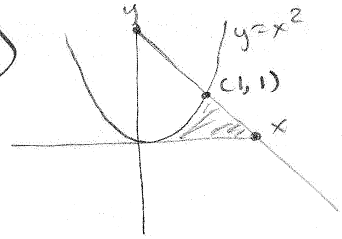
$\int_0^2 (12-x^2)-(x)\,dx = 12x - \frac{x^3}{3} - \frac{x^2}{2}\Big|_0^2$

$= 24 - \frac{8}{3} - 2$

$= 22 - \frac{8}{3}$

$= \frac{58}{3}$

78)



$x^2 = 2-x$

$x^2+x-2=0$

$(x+2)(x-1)=0$

$x=-2$

$x=1$

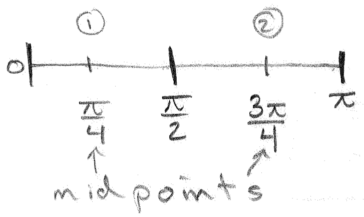
$$\int_0^1 x^2\,dx + \int_1^2 2-x\,dx$$

$$\frac{x^3}{3}\Big|_0^1 + 2x - \frac{x^2}{2}\Big|_1^2$$

$$\frac{1}{3} + 4 - 2 - 2 + \frac{1}{2}$$

$$\frac{2}{6} + \frac{3}{6} = \boxed{\frac{5}{6}}$$

79)



base of each rectangle $= \frac{\pi}{2}$

height of ① $= \left(\frac{\pi}{4} - \sin\frac{\pi}{4}\right)^2$

height of ② $= \left(\frac{3\pi}{4} - \sin\frac{3\pi}{4}\right)^2$

$$\text{Area} \approx \frac{\pi}{2}\left(\frac{\pi}{4} - \frac{\sqrt{2}}{2}\right)^2 + \frac{\pi}{2}\left(\frac{3\pi}{4} - \frac{\sqrt{2}}{2}\right)^2$$

$$\frac{\pi}{2}\left[\left(\frac{\pi^2}{16} - \frac{2\sqrt{2}\pi}{8} + \frac{2}{4}\right) + \left(\frac{9\pi^2}{16} - \frac{6\sqrt{2}\pi}{8} + \frac{2}{4}\right)\right]$$

$$\boxed{\frac{\pi}{2}\left(\frac{5}{8}\pi^2 - \sqrt{2}\pi + 1\right)}$$