$$\text{Error} \leq \left| \frac{f^{(n)}(z)\, x^n}{n!} \right|$$

$$\frac{dy}{dx} = xy \qquad (0, e)$$

$$\frac{d^2y}{dx^2} = y + x(y') = y + x^2 y$$

$$\int \frac{dy}{y} = \int x\, dx$$

$$\ln|y| = \frac{x^2}{2} + C$$

$$\ln(e) = 0 + C$$

$$C = 1$$

$$\ln|y| = \frac{x^2}{2} + 1$$

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

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

$$-\ln(\cos x) = \ln\left((\cos x)^{-1}\right)$$

$$= \ln\left(\frac{1}{\cos x}\right) = \ln(\sec x)$$

$$3\ln(2) - \ln(3) + \ln(1)$$

$$\ln\left(\frac{2^3}{3}(1)\right) = \ln\left(\frac{8}{3}\right)$$

$$\ln(2^3) - \ln(3) + 0$$

$$\ln\left(\frac{2^3}{3}\right)$$

$$\int_0^5 x\sqrt{25-x^2}\,dx$$

$u = 25 - x^2$ $\qquad x=0 \rightarrow u=25$

$du = -2x\,dx$ $\qquad x=5 \rightarrow u=0$

$\dfrac{du}{-2x} = dx$ $\qquad \displaystyle\int_{25}^{0} x\sqrt{u}\,\frac{du}{-2x}$

$$= -\frac{1}{2}\int_{25}^{0}\sqrt{u}\,du = \frac{1}{2}\int_0^{25}\sqrt{u}\,du = \frac{1}{2}\left(\frac{2}{3}u^{3/2}\Big|_0^{25}\right)$$

$$= \frac{1}{2}\left(\frac{2}{3}(25)^{3/2} - \frac{2}{3}(0)^{3/2}\right)$$

$$\int \frac{2x-3}{(x+1)(x-1)} = \int \frac{A}{x+1} + \frac{B}{x-1}$$

$$A = \frac{2(-1)-3}{-1-1} = \frac{5}{2} \qquad B = \frac{2(1)-3}{1+1} = \frac{-1}{2}$$

$$\int \frac{\frac{5}{2}}{x+1} + \frac{-\frac{1}{2}}{x-1}\,dx = \frac{5}{2}\int\frac{1}{x+1}\,dx - \frac{1}{2}\int\frac{1}{x-1}\,dx$$

$$= \frac{5}{2}\ln|x+1| - \frac{1}{2}\ln|x-1| + C$$

$$\lim_{x\to 2} \frac{x^2-4}{x-2} = \frac{0}{0}$$

$$\lim_{x\to 2} \frac{2x}{1} = 4$$

$$\lim_{x\to 4} \frac{\int_4^x \ln(x)\,dx}{\sin(\pi x)} = \frac{\int_4^4 \ln x\,dx}{\sin(4\pi)} = \frac{0}{0}$$

$$\lim_{x\to 4} \frac{\ln(x)\cdot 1 - \ln(4)\cdot 0}{\pi\cos(\pi x)}$$

$$= \frac{\ln(4)}{\pi\cos(4\pi)} = \frac{\ln(4)}{\pi}$$

$$\frac{d}{dx}\left(\int_u^v f(t)\,dt\right) = f(v)\cdot v' - f(u)\cdot u'$$

$$\lim_{h\to 0} \frac{\sin\left(\frac{\pi}{2}+h\right)-1}{h} = \lim_{h\to 0} \frac{\sin\left(\frac{\pi}{2}+h\right)-\sin\left(\frac{\pi}{2}\right)}{h} = \cos\left(\frac{\pi}{2}\right)$$

$$\lim_{h\to 0} \frac{\cos\left(\frac{\pi}{2}+h\right)}{1} = 0$$

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = f'(x)$$

$$f(x) = \sin x$$

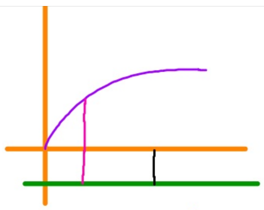
$$f'(x) = \cos x$$

$$\frac{d}{dx}\left(3^{-x^2}\right) = 3^{-x^2}\ln(3)(-2x)$$

B in Q1

$y=\sqrt{x}$, $x=2$

around $y=-1$



$OR = \sqrt{x}-(-1)$

$IR = 0-(-1)$

$$V=\pi\int_0^2 (\sqrt{x}+1)^2-(1)^2\,dx = \pi\int_0^2 (\sqrt{x}+1)(\sqrt{x}+1)-1\,dx$$

$$=\pi\int_0^2 x+2\sqrt{x}+1-1\,dx = \pi\int_0^2 x+2\sqrt{x}\,dx$$

$$=\pi\int_0^2 x+2x^{1/2}\,dx$$

$$=\pi\left(\frac{x^2}{2}+\frac{2x^{3/2}}{\frac{3}{2}}\Bigg|_0^2\right)$$

$$=\pi\left(\frac{2^2}{2}+\frac{2(2)^{3/2}}{\frac{3}{2}}\right)$$

$$\int x\sqrt{9-x^2}\,dx \qquad \int \sin(4x)\,dx$$

$$\int 4x^3e^{x^4}\,dx \qquad \int x(9-x^2)\,dx$$

$$=\int 9x-x^3\,dx$$

$$\int x\sqrt{9-x}\,dx$$

$$\int x\sqrt{u}\,(-du)$$

$u = 9-x$

$du = -dx$

$-du = dx$

$u = 9-x \rightarrow x = 9-u$

$$-\int (9-u)\sqrt{u}\,du = -\int u^{1/2}(9-u)\,du$$

$$\int \frac{1}{x^2}\,dx = \int x^{-2}\,dx$$

$$\int \frac{1}{5x}\,dx \qquad u = 5x$$