10) $$\int_{-\infty}^{\infty} \frac{3x+2}{(x^2+9)(x-4)x}\,dx$$

$$= -\frac{1}{255}\int \frac{19x+126}{x^2+9}\,dx - \frac{1}{18}\int \frac{1}{x}\,dx + \frac{7}{50}\int \frac{1}{x-4}\,dx$$

$$= \int\left(\frac{19x}{x^2+9} + \frac{126}{x^2+9}\right)dx = 19\int \frac{x}{x^2+9}\,dx + 126\int \frac{1}{x^2+9}\,dx$$

$$= \int \frac{x}{x^2+9}\,dx = \frac{1}{2}\int \frac{1}{u}\,du = \frac{\ln(x^2+9)}{2}$$

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

$$= -\frac{19\ln(x^2+9)}{450} - \frac{\ln(x)}{18} - \frac{14\arctan\left(\frac{x}{3}\right)}{75} + \frac{7\ln(x-4)}{50}$$

$$= \frac{25\ln(|x|) + 19\ln(x^2+9) + 84\arctan\left(\frac{x}{3}\right) - 63\ln(|x-4|)}{450}$$

$$= -\frac{14\pi}{75}$$

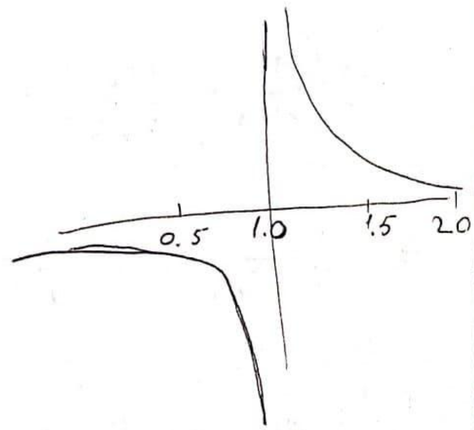
$+C$

7) $f(z) = \frac{4z-1}{z^2+z-2}$ center 1

$$\frac{1}{z-1} + 1 - \frac{z-1}{3} + \frac{1}{9}(z-1)^2 - \frac{1}{27}(z-1)^3 + \frac{1}{81}(z-1)^4 + O((z-1)^5)$$

converges when $|z-1| < 3 \wedge z \neq 1$

$$\sum \left(-\frac{1}{3}\right)^n (-1+z)^n + \frac{1}{z-1}$$



9)

$$\int_0^{\pi} \frac{10}{4+3\cos\theta}\,d\theta$$

$$= 10\int \frac{1}{3\cos\theta+4}\,d\theta = \frac{\sec^2\left(\frac{\theta}{2}\right)}{\tan^2\left(\frac{\theta}{2}\right)+7}\,d\theta = \frac{2}{\sqrt{7}}\int\frac{1}{u^2+1}\,du$$

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

$$\frac{2\arctan(u)}{\sqrt{7}} = \frac{2\arctan\left(\frac{\tan\left(\frac{\theta}{2}\right)}{\sqrt{7}}\right)}{\sqrt{7}}$$

$$= 10\int\frac{1}{3\cos(\theta)+4}\,d\theta = \frac{20\arctan\left(\frac{\tan\left(\frac{\theta}{2}\right)}{\sqrt{7}}\right)}{\sqrt{7}} + C$$