$\frac{dz}{(z+1)(z-1)}$ $z_0 = 1$

$\frac{\frac{dz}{z+1}}{z-1}$ $f(1) = \frac{1}{2\pi i} \oint \frac{dz}{z+1}$

$\frac{1}{\cancel{2}} \times \cancel{2}\pi i = \oint \frac{dz}{z+1}$

$\oint \frac{dz}{z+1} = \pi i$

PROBLEM SET 14.4

$\boxed{1-8}$

Integrate counterclockwise around the circle $|z| = 2$. (n is a positive integer, a is arbitrary. Show details of your work.

1 - $\frac{\cos 3hz}{z^5}$ $c: |z| = 2$ $f(z)$ $\frac{\cos 3hz}{z^5}$, $n = 4$, $z_0 = 0$

$f^{iv}(z) = \frac{4!}{2\pi i} \oint \frac{f(z)}{} dz$;

$-81\cosh 3z = 4! \oint$ $f(z) = \cos 3hz$

Scanned by CamScanner

Alternating series test; suppose we have $(-1)^n b_n$ or $a_n = (-1)^{n+1} b_n$ where $b_n \geq 0$,

(3) If (a) $\lim_{n\to\infty} b_n = 0$ and b_n is decreasing sequence, the series converges.

$f'(\pi/2) = \frac{1}{2\pi i} \oint f(z)dz$

$e^{\pi/2}(\pi/2(-1) \times 2\pi i - (-e^{\pi/2})(\pi i^2)$

(3) $\frac{e^z \cos z}{(z-\pi/2)^2}$

$e^x(\cos y + i \sin y)(\cos x + iy)$

$n = 1$

$f'(z) = -e^z \sin z + z e^z \cos z$

$f'(\pi/2) = \frac{1}{2\pi i} \oint e^z \cos z$

$-e^{\pi/2} + \frac{\pi}{2} e^{\pi/2} = \frac{1}{2\pi i} \oint e^z \cos z.$

$e^{\pi/2}\left[\frac{\pi}{2} - 1\right] = \frac{1}{2\pi i}\Big] \oint e^z \cos z$

$2\pi i e^{\pi/2}\left[\frac{\pi}{2} - 1\right] = \oint e^z \cos z.$

Sequence and Series

* The divergent test;

If $\lim_{n\to\infty} Z_n \neq 0$, then $\sum_1^\infty Z_n$ is dgt. (If a series is a convergt, then $\lim_{n\to\infty} Z_n = 0$, If it doesn't hold the series diverges).

If $Z_n = 0$, the test doesn't hold.

Exp 1; $\sum_1^\infty \left(1 + \frac{1}{n}\right)^n$

$Z_n = \left(1 + \frac{1}{n}\right)^n$

$\lim_{n\to\infty} Z_n = \lim_{n\to\infty}\left(1 + \frac{1}{n}\right)^n$

$= e \neq 0$ dgt

Exp 2 $\sum_1^\infty \frac{\ln n}{1 + \ln(n)}$

$Z_n = \frac{\ln n}{1 + \ln n}$

$\Rightarrow \lim_{n\to\infty} Z_n = \lim_{n\to\infty} \frac{\ln n}{1 + \ln n} = \frac{\infty}{\infty}$

Apply L hopital's rule

$\frac{1/n}{0 + 1/n}$ $\Rightarrow \lim_{n\to\infty} \frac{1/n}{1/n} = 1 \neq 0$

Convergent.

Exp $\sum_1^\infty 1/n$ $Z_n = 1/n$

$\lim_{n\to\infty} Z_n = \lim_{n\to\infty} \frac{1}{n} = 0$ (divergent test not applicable