

- Express in the form  $a + ib$ , where  $a$  and  $b$  are real numbers. 1)  $e^{3+4i}$   
2)  $e^{e^i}$
- Consider a contour consisting of that part of the curve  $y = 1 - x^2$  that goes from the point  $A = (0, 1)$  to the point  $B = (1, 0)$ . Let  $F(x, y) = xy$ . Show

$$\int_A^B F(x, y) dx = \frac{1}{4}; \quad \int_A^B F(x, y) dy = \frac{-4}{15}.$$

- Let  $C$  be the contour traversed counterclockwise which is the triangle with vertices at  $0, 2 - 2i, 2 + 2i$ . Find the integral

$$\int_C \frac{\cos z}{z - 1} dz$$

Hint: Find an appropriate function and use Cauchy's theorem.

- Let  $C$  be the contour  $|z| = 2$ . Show that

$$\int_C \frac{z^3 + 2z + 1}{(z - 1)^3} dz = 6\pi i.$$

- From the series for  $1/(1 - z)$  about  $z = 0$ , find the series for  $2/(1 - z)^3$ .
- Expand

$$\frac{e^{az} - 1}{z}$$

about  $z = 0$ .

- Show that

$$\frac{z}{(z - 1)(z - 3)}$$

expanded in powers of  $z - 1$  is

$$\frac{-1}{2(z - 1)} - 3 \sum_{k=1}^{\infty} \frac{(z - 1)^{k-1}}{2^{k+1}}$$