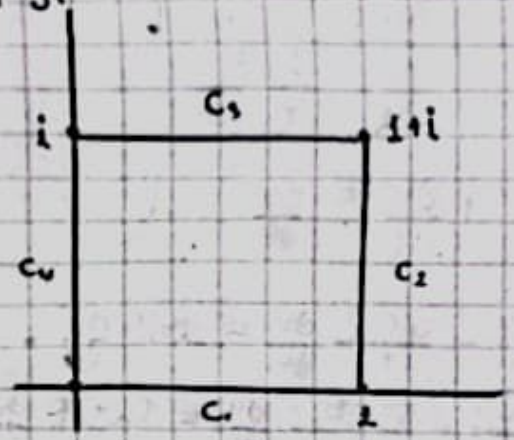
5) $f(z) = \pi e^{\pi z}$ $c = 0, 1, 1+i, yi$

$$\int_c f(z)\,dz$$



$z = 0 \quad 0 \le x \le 1$

$z = 1 + iy \quad 0 \le y \le 1$

$z = (1-x) + i \quad 0 \le x \le 1$

$z = i - iy \quad 0 \le y \le 1$

$$\int_c f(z)\,dz = \int_0^1 \pi e^{\pi x}\,dx + \int_0^1 \pi e^{\pi(1-iy)}\,i\,dy + \int_0^1 \pi e^{\pi((1-x)-1)}(-1)\,dx + \int_0^1 \pi e^{-\pi(i-iy)}(-i)\,d$$

$$= e^{\pi} - 1 + 2e^{\pi} + e^{\pi} - 1 - 2$$

$$= 4e^{\pi} - 4$$

$$= 4(e^{\pi} - 1)$$

$(1-t, 0) + (1, t) \qquad (1-t, 1-t) + (0, t)$

$(1, t)$

$P = (1-t)(0,0) + t(1,0)$

$= (t, 0) \quad 0 \le t \le 1$

$P = (1-t)(1,0) + t(1,1)$

$= (1, t)$

$P = (1-t)(1,1) + t(0,1)$

$= (1-t, 1)$

$P = (1-t)(0,1) + t(0,0)$

$= (0, 1-t)$

$(0, 1-t) + (0, 0)$

$(0, 1-t)$