(1) Once upon a time, in 18.03, we promised that cx variables and functions would speed your work on items like
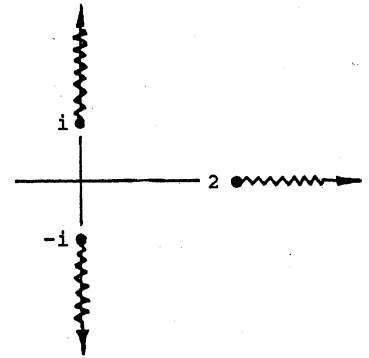
"Solve $x^2 y'' + y = 0$, subject to $y(1) = 0, y'(1) = 1$."

Well, do they? Or have you forgotten $y(x) = x^r$, etc ?

(2) Assume we are dealing with that <u>**branch**</u> of the function

$$w(z) \ = \ \sqrt{z+i} \ + \ \sqrt{z-2} \ + \ \sqrt{z-i} \ .$$

for which $w(0) = 2 \exp(-i\pi/4)$ with the branch cuts shown on the right.

Kindly evaluate $w(2+i)$ and $w'(2+i)$.

(3) Evaluate the obnoxious integral $\displaystyle\oint_{|z|=1} \frac{\overline{z}}{4z^2 - 1} \, dz$.

(4) Evaluate the dreadful $\displaystyle\oint \frac{dz}{(z+1)(z-1)(z-2)(z-3)(z-4)(z-5)}$

once counterclockwise around the circle $|z-3| = 3$.

(5) Since we know from PSet 1 that one root of $\exp(z) = z - 1$ lies close to $z = 0.605021 + 1.788188i$ (and that no other root matters), estimate

$$\oint \frac{dz}{e^z - z + 1}$$

taken once around the square on the right.