Solutions to Homework Assignment 27

MATH 345

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1. (a) Since $\pi i/2$ lies inside the square, this is $2\pi i e^{-\pi i/2} = 2\pi$.

   (b) The only singularity inside the square is $z = 0$, so we get $2\pi i \dfrac{\cos 0}{0^2 + 8} = \dfrac{\pi i}{4}$.

   (c) Since $z = -1/2$ is inside the square, we get $\int_C \dfrac{z/2}{z + 1/2} dz = 2\pi i(-1/2)/2 = -\pi i/2$.

   (d) $(\cosh z)''' = \sinh z$, and $\sinh 0 = 0$, so the integral is 0.

   (e) $(\tan(z/2))' = \dfrac{1}{2}\sec^2(z/2)$, so the integral is $2\pi i \dfrac{1}{2}\sec^2(x_0/2) = i\pi \sec^2(x_0/2)$,

3. If $|w| > 3$, then $g(w) = 0$. If $|w| < 2$, then $g(w) = 2\pi i(2w^2 - w - 2)$. For $w = 2$, this is $8\pi i$.