

MAT 342, Homework 11 due 11/20

Questions from the textbook questions **1abc** p. 237; questions **1abd, 2bc, 4** p.242.

More questions:

1. Determine the type of the singular point(s) for each of the given functions. Find the corresponding residue. Use the Cauchy residue theorem (section 76) to compute the integral of the function over the circle $|z| = 2$, oriented counterclockwise.

$$(a) \frac{e^{-z^2}}{(z-1)^2} \quad (b) z^3 e^{\frac{1}{z}}$$

Is it possible to use the Cauchy integral formula (section 54) or its extension (section 55) to compute the same integrals by a different method? If so, do the computation. If the method does not apply, explain why.

2. For each of the functions below, show that each singular point of the function is a pole. Determine the order of each pole and find the corresponding residue. Use this information to compute the integral of the function over the contour given by the circle $|z-1| = 3$, oriented counterclockwise. Make a picture of the contour before computing the integral.

$$(a) \frac{z+1}{z^2-9}; \quad (b) \left(\frac{z}{1-3z}\right)^3 \quad (c) \frac{\cos z}{z^2-\pi^2}$$

Optional but recommended for better conceptual understanding: question **8** p. 247. Also, read section 77 and do questions **4ab, 6, 7** on p. 237.