

MATH4060 Exercise 3

Due Date: October 18, 2016.

The questions are from Stein and Shakarchi, *Complex Analysis*, unless otherwise stated.

Chapter 2. Exercise 11, 12.

Chapter 3. Exercise 15(a)(d), 19.

Chapter 5. Exercise 4, 5, 10, 11, 14, 15.

Chapter 6. Exercise 5, 12.

Additional Exercise. Show that if $c > 0$, then

$$\frac{1}{2\pi i} \int_{c-i\infty}^{c+i\infty} \frac{a^s}{s(s+1)} ds = \begin{cases} 0 & \text{if } 0 < a \leq 1 \\ 1 - \frac{1}{a} & \text{if } a \geq 1. \end{cases}$$

Here the integral is taken over the vertical line $\operatorname{Re} s = c$. (Hint: Consider the straight line contour from $c - iR$ to $c + iR$. Complete this by a semi-circular arc centered at c and of radius R , either in the clockwise or the anti-clockwise direction, as appropriate.)

Correction. In Chapter 2, Exercise 12(b), in the integral formula one should read $u(e^{i\varphi})$ instead of $u(\varphi)$.