1. Evaluate the following integrals for $f(z) = z^2$.

(a). $\displaystyle\int_{\Gamma_1} z^2\, dz$ where Γ_1 is the contour that consists of the line segments from $z = 0$ to $z = 3$ and from $z = 3$ to $z = 3 + 2i$.

(b). $\displaystyle\int_{\Gamma_2} z^2\, dz$ where Γ_2 is the contour that consists of the line segment from $z = 0$ to $z = 3 + 2i$.

You should notice something interesting about your results. What is it?

2. Evaluate the following integrals for $f(z) = \overline{z}$ with the same contours as problem 1.

(a). $\displaystyle\int_{\Gamma_1} \overline{z}\, dz$ where Γ_1 is the contour that consists of the line segments from $z = 0$ to $z = 3$ and from $z = 3$ to $z = 3 + 2i$.

(b). $\displaystyle\int_{\Gamma_2} \overline{z}\, dz$ where Γ_2 is the contour that consists of the line segment from $z = 0$ to $z = 3 + 2i$.

Did the same interesting result occur?

What is a fundamental difference between the functions $f(z) = z^2$ and $f(z) = \overline{z}$?