

PHZ3113–Introduction to Theoretical Physics

Fall 2008

Problem Set 16

Nov. 19, 2008

Due: Friday, Nov. 21, 2008

Reading: Boas Ch. 14

1. Find residues of

(a)

$$\frac{z^2}{z^4 + 16} \quad (1)$$

at  $z_0 = \sqrt{2}(1 + i)$ .

(b)

$$\frac{1}{(3z + 2)(2 - z)} \quad (2)$$

at all poles.

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Using complex integration methods as in class, evaluate

2.

$$\int_0^{2\pi} \frac{d\theta}{(a + \cos \theta)^2} \quad (3)$$

3.

$$\int_{-\infty}^{\infty} \frac{\cos x}{x^2 + a^2} dx \quad (4)$$

4.

$$\int_0^{\infty} \frac{x^2 dx}{(x^2 + 4)(x^2 + 9)} \quad (5)$$

5.

$$\int_0^{\infty} \frac{k^2 dk}{k^2 + m^2} \frac{\sin kr}{kr} \quad (6)$$