MATH 464, PRE-HW

1) Solve the differential equation $f'(x) = -2\pi c x f(x)$, where $c > 0$ is a fixed constant.

2) Integrate:

$$\int_0^{\pi} \cos^2(x)\, dx$$

$$\int_0^{10\pi} \sin(e^x)e^x\, dx$$

3) Let $|z|$ denote the modulus of the complex number $z = a + ib$ (i.e., a number such that $|z|^2 = a^2 + b^2$). Show that

$$|z_1 + z_2| \leq |z_1| + |z_2|$$

$$|z|^2 = z\overline{z}$$

4) Show that

$$\cos(\phi + \theta) = \cos(\phi)\cos(\theta) - \sin(\phi)\sin(\theta).$$

5) Solve the differential equation

$$f''(x) + c^2 f(x) = 0.$$

6) Let M be a 4×4 matrix defined by $M(j,k) = \frac{1}{2}e^{2\pi ijk/4}$, $j,k = 1,\ldots,4$. Find the determinant of M.