Term Test C version 1, part I

(1) [10 points] Identify the following two conic sections and draw a diagram. Find the equation for the conic section in its canonical form and list the following features:

parabola vertex

circle centre and radius

ellipse centre, semi-major axis, semi-minor axis

hyperbola centre, equation of asymptotes

$$2y^2 + 14 = x + 12y$$

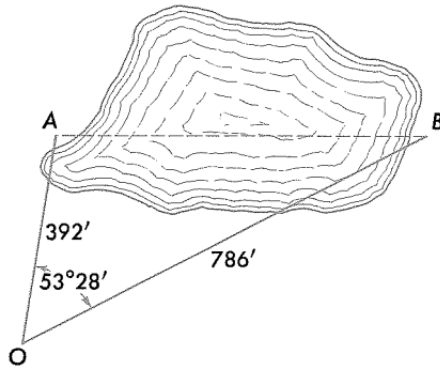$$\frac{1}{5}x^2 + \frac{1}{4}y^2 + \frac{2}{5}x + \frac{1}{6}y = \frac{139}{180}$$

(2) [10 points] Simplify as much as possible

$$\frac{\frac{x^2-14x+48}{x^2-64}}{\frac{x^2-5x-6}{x^2+10x+16}}$$

$$\sqrt{(x^2-3)^2 - (2x+4)(2x-4)}$$

Term Test C version 1, part II

(3) [5 points] The inaccessible distance AB across the pond is to be found from the survey data shown in the figure. The given distances were measured from point O by means of stadia.

(4) [5 points] When light passes through a transparent medium, its intensity is reduced according to the equation

$$I = I_0 c^{\frac{d}{k}}$$

where I_0 is the initial light intensity, I is the intensity after passing through a medium of thickness d, and both c and k are constants depending upon the nature of light and of the medium.

If the intensity of sunlight is reduced to half its original value after penetrating water to a depth of 4 feet: (a) evaluate c and k. (b) At what depth will the light intensity be 10% of that at the surface?

(5) [12 points] Solve the following three equations:

$$8^x = \frac{8}{2^{x-3}}$$

$$\sin 2x + 2\sin x = \cos x + 1$$

$$\ln x - \ln(x+3) = -1$$