MATH 1710 Tutorial 3

In Problems 1–4, find the length of the curve.

1. $24xy = x^4 + 48$ from $(2, 4/3)$ to $(3, 43/24)$

2. $y = (3/2)x^{1/3} - (3/10)x^{5/3}$ between the lines $x = 1$ and $x = 8$

3. $y = [\ln(\cos x) + \ln(\sin x)]/2$ from $x = \pi/4$ to $x = \pi/3$

4. $3x = 2(y^2 + 1)^{3/2}$ from $(4\sqrt{2}/3, 1)$ to $(18, -2\sqrt{2})$

5. While a particle moves along the x-axis from $x = a$ to $x = b$, where $b > a > -1$, it is acted on by a force whose x-component is $F(x) = x/\sqrt{2x + 5}$ Newtons. What work is done by the force if all distances are in metres?

6. A tank in the form of a right circular cone with height 4 metres and radius 1 metre has its flat surface horizontal and above the vertex of the tank. It is full of kerosene with density 820 kilograms per cubic metre. How much work is required to empty the tank to a height 2 metres above its flat surface?

7. A 2-metre chain with mass 20 kilograms lies on the floor. If friction between floor and chain can be ignored, how much work is required to lift one end of the chain 4 metres straight up? Assume that vertical and horizontal portions of the chain make a right angle.

Answers: **1.** $9/8$ **2.** $54/5$ **3.** $(1/4)\ln 3$ **4.** $(5 + 38\sqrt{2})/3$
5. $(1/6)[(2b + 5)^{3/2} - (2a + 5)^{3/2}] + (5/2)[\sqrt{2a + 5} - \sqrt{2b + 5}]$ J
6. $1.01 \times 10^5 J$ **7.** 588.6 J