DISTANCE EDUCATION
MATH 1500
WINTER TERM 2016: D01/D02

Assignment 5
Sections 4.7, 4.9, 5.1, 5.2, 5.3.
Total Marks: 60
Due Date: **Mar 20, 2016**.

SHOW ALL WORK to get full marks.

[7] 1. Find the points on the ellipse $4x^2 + y^2 = 4$ that are furthest away from the point $(1, 0)$.

[5] 2. A rectangular storage container with an open top is to have a volume of 10 m^3. The length of the base is twice the width. Material for the base costs \$5 per square meter. Material for the sides costs \$6 per square meter. Find the cost of the materials for the cheapest such container.

[6] 3. Find the most general antiderivative of the function.
   (a) $r(\theta) = \frac{1}{2}e^{3\theta} - \sec^2 \theta + \sin(2\theta)$.
   (b) $g(t) = \frac{1+t^2-\sqrt{t}}{t}$.

[5] 4. A particle is moving with the given data. Find the position of the particle.

$$a(t) = -\frac{1}{3}\cos t - 2\sin t, \, s(0) = -1, v(0) = 3.$$

[5] 5. Evaluate the following integral by interpreting it in terms of areas

$$\int_{-4}^{0} x - \sqrt{16 - x^2} \, dx.$$

[4] 6. If $\int_{0}^{9} f(x) \, dx = 7$ and $\int_{0}^{9} g(x) \, dx = 2$, find

$$\int_{0}^{9} [2f(x) + 3g(x) - 4] \, dx.$$

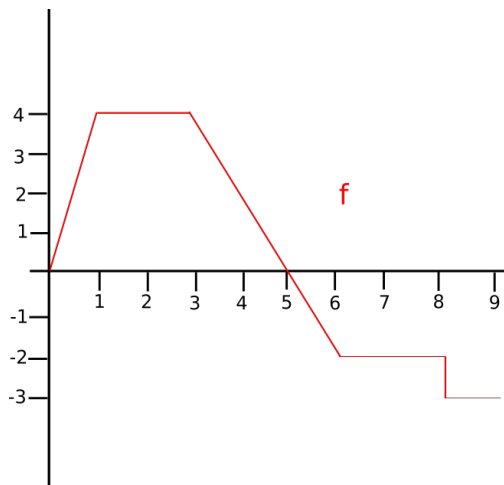[7] 7. Use Part 1 of the fundamental theorem of calculus to find the derivative of the following function

$$g(x) = \int_{\cos(x)}^{\sin(x)} \ln(1 + 2t) \, dt.$$

[6] 8. Evaluate the following integral

$$\int_{0}^{1} x^{e^2} + e^x + x(x + 1) \, dx.$$

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[7] 9. Let $g(x) = \int_0^x f(t)\,dt$, where f is the function whose graph is shown below.

   (a) Evaluate $g(3)$, $g(5)$ and $g(9)$.

   (b) On what interval is g increasing?

   (c) Where does g have a maximum value?

   (d) Draw a rough sketch of g.

[8] 10. Find the area of the region bounded between the graph of

$$f(x) = x^2 + 2x - 8$$

and the x-axis. Include a rough sketch of the curve.