MA 126 - 6D,   CALCULUS II

March 14, 2016

Name (Print last name first): ....

 Student Signature: ....

$$\boxed{\textbf{TEST II}}$$

$$\boxed{\textbf{No calculators are allowed!}}$$

12 questions, 10 points each. SHOW ALL YOUR WORK!

Question 1

Find the area of the region bounded by the parabola $y = -2x - x^2$ and the line $y = 2x$.

Question 2

Shown is the graph of a force function. How much work is done by the force in moving an object a distance of 10 m?

Question 3

Use the graph below to set up and write out the mid-point rule approximation of the integral $\int_0^5 f(x)\,dx$ with 5 sub-rectangles. (Do NOT add up the terms!)

Question 4

Find $a > 0$ such that

$$\int_0^a x \, dx = 8.$$

Question 5

Determine whether the series is absolutely convergent, conditionally convergent or divergent.

a)

$$\sum_{n=1}^{\infty} \frac{2}{n + n^3}.$$

b)

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{\sqrt{n}}.$$

Question 6

Determine whether the series is convergent or divergent.

a)

$$\sum_{n=1}^{\infty} n^3 \left(\frac{1}{2}\right)^n.$$

b)

$$\sum_{n=1}^{\infty} \frac{n}{n + n^2}.$$

Question 7

Determine whether the series is absolutely convergent, conditionally convergent or divergent.

a)

$$\sum_{n=1}^{\infty} (-1)^n e^{-n}.$$

b)

$$\sum_{n=1}^{\infty} (-1)^n \frac{n}{n + 10}.$$

Question 8

Find the radius and interval of convergence of the power series

$$\sum_{n=1}^{\infty} \frac{2^n (x-2)^n}{n^2}.$$

Question 9

Express the function

$$f(x) = \frac{1}{1-x^3}$$

as the power series.

Question 10

Express the function
$$f(x) = \frac{2x - 4}{x^2 - 4x + 3}$$
as the power series.

Question 11

a) Find the series representation for the function

$$f(x) = \frac{1}{1 + x^3}.$$

b) Use the series in a) to write out a series representation for

$$\int_0^{1/2} \frac{1}{1 + x^3} dx.$$

(Do NOT compute and add the terms for your series!)

Question 12

A rope that weighs 0.5 kg/m is used to lift 10 kg of water up a well 10 m deep.
a) Find the work needed to lift the rope (only) to the top.

b) Find the work needed to lift the water (only) to the top.

c) Find the total work required to lift both the rope and the water to the top.