MAT 1332, Winter 2015, Assignment 1
Due Wednesday January 27 in the math department dropboxes by 7:00pm.
Late assignments will not be accepted; nor will unstapled assignments.
Professors in the math department will not lend you a stapler; do not ask for one.

Instructor (circle one): Robert Smith? Petko Kitanov Catalin Rada

DGD (circle one): 1 2 3 4

Student Name _____ Student Number _____

By signing below, you declare that this work was your own and that you have not copied from any other individual or other source.

Signature _____

QUESTION 1. Calculate the following

(a) $\int \frac{x^{3/2} - 5x}{\sqrt{x}} dx$

(b) $\int \left(\sin x + 4x^2 - \frac{6x}{\sqrt[3]{x}} \right) dx$

(c) $\int \sec^2 x \tan x dx$

(d) $\int (x^3 + x)^{10}(3x^2 + 1)dx$

(e) $\int x^4 \ln x dx$

(f) $\int x \sin(x/2) dx$

(g) $\int \frac{e^{1/x}}{5x^2} dx$

QUESTION 2. Consider the function $f(x) = \dfrac{9x^2 - 17x + 6}{x(x-1)(x-2)}$

(a) Decomposer $f(x)$ into partial fractions.

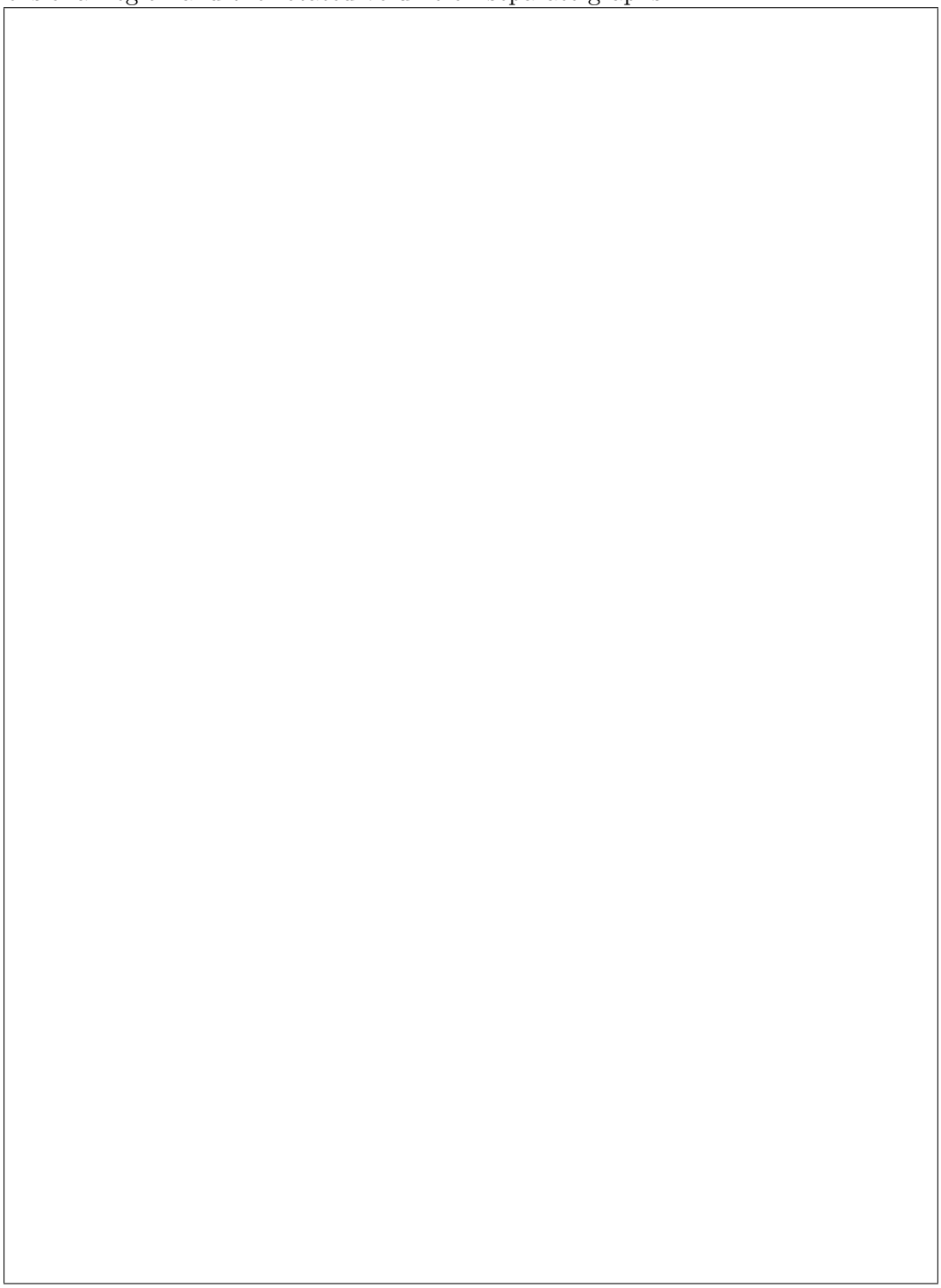
(b) Calculate $\displaystyle\int f(x)dx$

Question 3.

(a) Sketch the region enclosed by the curves $y = 2 - x$ and $y = x^2$.

(b) Find the area of this region.

QUESTION 4. Consider the region enclosed by the curve $y = 3x - x^2$ and the x-axis. Determine the volume of revolution described by rotating the surface around the x-axis. Sketch the two-dimensional region and the rotated volume on separate graphs.



QUESTION 5. Determine whether each of the following integrals converges or diverges. If it converges, calculate the value.

(a) $\displaystyle\int_1^3 \frac{x}{(x^2-9)^{4/3}}dx$

(b) $\displaystyle\int_{-1}^1 \frac{x^3}{\sqrt{1-x^4}}dx$

QUESTION 6. The growth of a raccoon can be characterised by $\frac{dw}{dt} = \frac{1}{\ln(t+2)}$ where t is the time in months and w is the weight in kilograms. Use five Riemann sums to estimate the amount that the raccoon grows between the first and third month.