Zworski – Fall 2014

NAME: STUDENT ID:

MATH 53 2nd MIDTERM

Please answer each question on a separate page – you can write on the back of the page. Remember to write your name and section number on EVERY page you turn in. Thanks! Good Luck!

Problem 1. Evaluate the following double integral:

$$\int_0^{\pi^2} \int_y^{\pi^2} (1/\sqrt{y}) \sin \sqrt{x}\, dx\, dy$$

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Problem 2. a) Define a *saddle point of a function.*

b) Find the local maxima, minima and saddle points of the following function:

$$f(x, y) = \frac{x^2 - y^2}{1 + x^2 + y^2}.$$

Problem 3. Find the surface area of the graph of $f(x, y) = 2\sqrt{2}x + 2y^2$ above the triangle with vertices $(0, 0), (0, 1), (1, 1)$.

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Problem 4. Find the volume of the solid defined by the following inequalities:

$$x \geq 0, \qquad x^4 + y^4 + 2y^2x^2 \leq z \leq x^2 + y^2, \qquad x^2 + y^2 \leq 1$$