Math 126
Summer 2016
Dr. Lily Yen

Test 2

Show all your work

Name: _____

Score: ___/45

No Calculator permitted in this part. Read the questions carefully. Show all your work and clearly indicate your final answer. Use proper notation.

Problem 1: Evaluate the following integrals analytically.

a. $\int x^5 \ln(x)\, dx$

Score: /3

b. $\int \frac{1}{\tan(6x)}\, dx$

Score: /3

c. $\int e^{2x} \sin(3x)\, dx$

Score: /4

d. $\displaystyle\int \frac{4+x}{x^2+x}\,dx$

Score: /4

Problem 2: Evaluate if possible, otherwise state why the integral does not exist.

$$\int_0^7 \frac{1}{(x-5)^{2/3}}\,dx$$

Score: /4

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Calculators permitted from here on.

Problem 3: Determine analytically the convergence of the following integral.

$$\int_1^\infty \frac{\sin(x)+2}{\sqrt{x}}\,dx$$

Score: /3

Problem 4: Suppose $\int_{-1}^{1} h(z)\,dz = 7$, and that $h(z)$ is an even function. Calculate the following:

a. $\int_0^1 h(z)\,dz =$ ☐

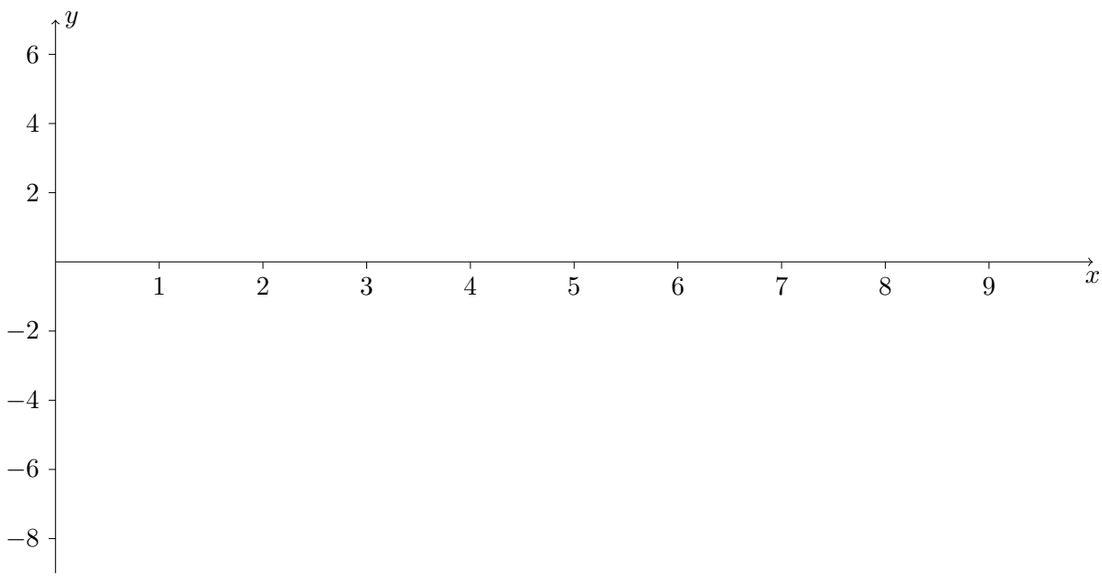
b. $\int_{-4}^{-2} 5h(z+3)\,dz =$ ☐

Score: /3

Problem 5: Consider the area bounded by the y-axis, $x+y=6$, and $y=x^2$ in the first quadrant. Find the average vertical height of this area.

Score: /4

Problem 6: Draw $y = 6 - 3x$ and $y = x^2 - 4$ on the grid. Shade the region bounded by these two graphs and the y-axis for non-negative values of x.



Use integrals to express the following. DO NOT EVALUATE YOUR INTEGRALS. Draw a cross-sectional strip for each solid of rotation.

a. The area of the shaded region.

Score: /2

b. The volume of a solid that has the shaded region as its base, and cross-sections perpendicular to the y-axis are equilateral triangles.

Score: /2

c. The volume of the solid obtained by rotating the region around $x = 5$.

Score: /2

d. The volume of the solid obtained by rotating the region around $y = -7$.

Score: /2

Problem 7: For your summer job, you work on a scaffolding 75 ft above the ground. Suppose you need to lift a 500 lb bucket of cement from the ground to a point 30 ft above the ground by pulling on a rope weighing 0.5 lb/ft. How much work is required?

Score: /4

Problem 8: Calculate the work done in pumping oil from a full (lower) hemispherical tank of radius 10 m out of a spout 2 m above the top of the hemisphere. Assume that the oil has density 800 kg/m^3.

Score: /5