Math 126
Summer 2018
Dr. Lily Yen

Test 2

Show all your work

Name: _____

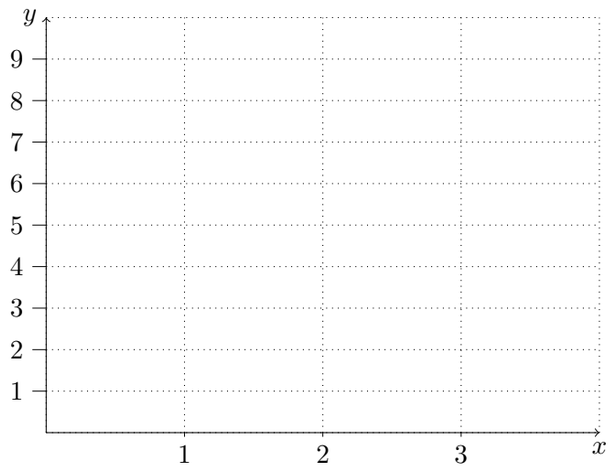
Number: _____

Signature: _____

Score: ___/48

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: First draw $y = 8/(x^2)$, $y = 8x$, and $y = x$. Shade the region enclosed by these three graphs. Clearly label the intersections.



Score: /3

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: /3

b. Use the washer method to find the volume obtained if the region is rotated about $y = 8$.

Score: /3

c. Use the method of cylindrical shells to find the volume obtained if the region is rotated about $x = 2$.

Score: /3

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

Score: /3

Problem 2: Evaluate the following integrals exactly.

a. $\int e^x \sin(2x)\, dx$

Score: /4

b. $\int \sqrt{x} e^{\sqrt{x}}\, dx$. Hint: Substitute $u = \sqrt{x}$.

Score: /4

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Calculators permitted from here on.

Problem 3: The acceleration of a particle is $a(t) = 60t - 4t^3$ in meters per second squared. Compute the average acceleration and the average speed over the time interval $[2, 6]$, assuming that the particle's initial velocity is zero.

Score: /4

Problem 4: Circle improper integrals below. State a brief reason next to each item.

a. $\displaystyle\int_0^1 \frac{dx}{\sqrt{3-x^2}}$

b. $\displaystyle\int_0^1 \frac{dx}{xe^x + x^2}$

c. $\displaystyle\int_0^1 \frac{dx}{(2x-1)^2}$

d. $\displaystyle\int_0^1 \sec(\pi x)\, dx$

Score: /6

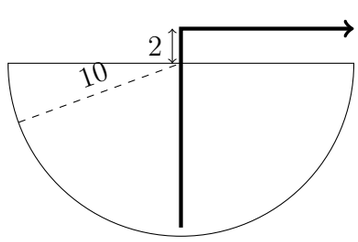
Problem 5: Find the volume of the solid obtained by rotating the region bounded by $f(x) = x^{-1/2}$, y-axis, and x-axis restricted to the domain $[0, 9]$ around the y-axis.

Score: /4

Problem 6: Evaluate using the method of partial fractions. $\displaystyle\int \frac{18}{(x+3)(x^2+9)}\,dx$

Score: /6

Problem 7: Compute the work (in joules) required to pump all of the water out of the full hemispherical tank shown. Distances are in meters, $g = 9.81\,\mathrm{m/s^2}$, and the density of water is $1000\,\mathrm{kg/m^3}$.



Score: /5