



University of Connecticut
Department of Mathematics

MATH 1131

REVIEW PROBLEMS

FALL 2018

NAME: _____

SIGNATURE: _____

Instructor Name: _____ Lecture Section: _____

TA Name: _____ Discussion Section: _____

- **THIS PRACTICE ONLY CONTAINS QUESTIONS ON MATERIAL COVERED SINCE EXAM 3. THE FINAL IS CUMULATIVE.**
- Use the practice exams from the previous three exams as review materials.
- The final exam has 10 free response questions and 20 Multiple choice questions.
- Each free response question is 5 points and MC is 1 point each. Free response has partial credit. MC does not have partial credit.

1. Be sure to look over practice exam 1, 2 and 3 to review that material.
2. If $w'(t) = \frac{\ln(t)}{t}$ is the rate of growth of a child in pounds per year, find $\int_5^{10} w'(t) dt$ and give an interpretation of your answer.

3. Evaluate the following definite and indefinite integrals:

(a) $\int_0^{\pi/4} \frac{1 + \cos^2(x)}{\cos^2(x)} dx$

(b) $\int_0^1 x^{10} + 10^x dx$

(c) $\int \left(\frac{1+r}{r}\right)^2 dr$

(d) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

(e) $\int_5^{10} \frac{dt}{(t-4)^2}$

(f) $\int_0^1 \frac{e^x}{1+e^{2x}} dx$

4. Sketch the region bounded by $y = \sqrt{x-1}$ and $x - y = 1$. Then find the area of the region.
5. Use calculus to find the area of the triangle with the given vertices.

$$(0, 0) \quad (3, 1) \quad (1, 2)$$

6. Consider the graph of the curve $y = \frac{1}{x}$.
 - (a) Find the area under the curve from $x = 1$ to $x = 100$.
 - (b) What happens to the area under the curve as the right hand endpoint goes to ∞ ?
 - (c) Find the volume of the solid obtained by rotating this curve around the x -axis from $x = 1$ to $x = 100$.
 - (d) What happens to the volume in part (c) as the right hand endpoint goes to ∞ ?
 - (e) Find the volume of the solid whose base is this region bounded by the curves $y = 1/x$, $y = 0$, $x = 1$ and $x = 100$ and whose cross-sections perpendicular to the x -axis are right triangles whose height is half their base.
 - (f) What happens to the volume in part (e) as the right hand endpoint goes to ∞ ?
7. Consider the region bounded by $y = \sqrt{x}$, $y = 1$ and $x = 4$. Set-up, but do not evaluate, integrals to find the following:
 - (a) Area of region
 - (b) Volume of solid obtained by rotating the region around the x -axis.
 - (c) Volume of solid obtained by rotating the region around the y -axis.
 - (d) Volume of solid obtained by rotating the region around the line $y = 1$.
 - (e) Volume of solid obtained by rotating the region around the line $x = 5$.