

Stony Brook

STATE UNIVERSITY OF NEW YORK

MAT 126 Final Exam – Fall 2017

Problem	1	2	3	4	5	6	7	8	9	10	11	13	14	15	Total	Percent
Score																

Last Name: _____ First Name: _____ Recitation #: _____ (See below)

Schedule

R01	F	10:00am-10:53am	Library	W4530	Mohamed El Alami
R02	Tu	1:00pm- 1:53pm	Mathematics	P131	Thomas Rico
R03	Th	4:00pm- 4:53pm	Earth & Space	69	David Bishop
R04	W	5:30pm- 6:23pm	Earth & Space	69	Tobias Shin
R05	W	4:00pm- 4:53pm	Physics	P116	Tobias Shin
R20	M	12:00pm-12:53pm	Harriman Hall	112	Selin Taşkent
R21	Th	10:00am-10:53am	Library	E4310	Ying Hong Tham
R23	Tu	4:00pm- 4:53pm	Library	N4072	Mohamed El Alami
R30	M	5:30pm- 6:23pm	Library	N4006	TanyaLisa Agha
R31	M	4:00pm- 4:53pm	Library	N4006	TanyaLisa Agha
R32	Th	2:30pm- 3:23pm	Library	E4310	Thomas Rico
R33	Th	7:00pm- 7:53pm	Library	E4310	Selin Taşkent

Reference Formulas: You may not need all of these.

$$\cos^2 x = \frac{1}{2}(1 + \cos 2x) \quad \sin^2 x = \frac{1}{2}(1 - \cos 2x)$$

$$\sin^2 x + \cos^2 x = 1 \quad \tan^2 x = \sec^2 x - 1$$

$$a^2 \cos^2 \theta = a^2 - a^2 \sin^2 \theta$$

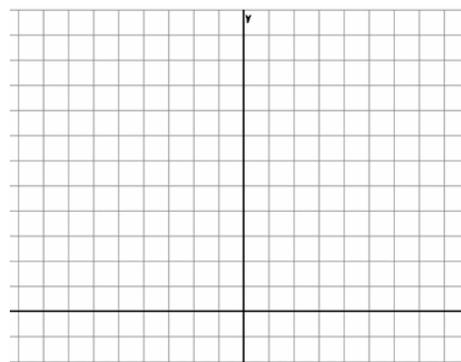
$$a^2 \tan^2 \theta = a^2 \sec^2 \theta - a^2$$

$$a^2 \sec^2 \theta = a^2 \tan^2 \theta + a^2$$

Directions: Answer all questions in the space provided. You may use the blank backs of pages for scrap. No other paper is permitted. Show ALL relevant work. Calculators are not to be used. Circle your final answers. Show all work in the space provided. Be sure that you don't have answers to any question in more than one place. Answers without the required work will receive little or no credit. Simplify your answers. Each numbered question is worth 10 points. Note that the total number of points is 150.

1. For the function $f(x) = x^2 - 1$ do the following:

a) Sketch the graph for $x = -1$ to $x = 3$ on the axes at the right. Pick appropriate scales.



b) Approximate $\int_{-1}^3 f(x) dx$ using a Riemann Sum using 4 sub-intervals and the LEFT endpoint of each sub-interval for as the sample points. Show the approximating rectangles on your graph. Use actual y values to compute the heights of the approximating rectangles.

2. Evaluate the integral: $\int x^2 e^{2x} dx$.

3. The graph of $f(x)$ is given at the right. Each square is 1 unit by 1 unit. If $g(x) = \int_0^x f(t) dt$ find the following:

a) $g(3)$

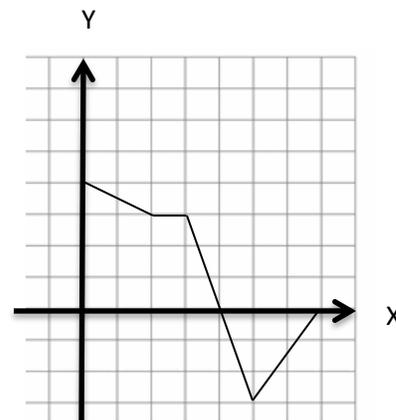
b) $g(5)$

c) $g(6)$

d) $g'(3)$ Hint: Fundamental Theorem

e) For what value of x does g have a maximum value?

4. Evaluate the integral $\int 2\cos^4 x \sin x dx$.



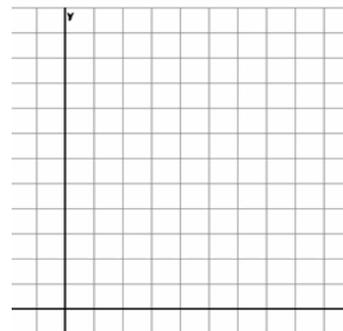
5. Evaluate the integral $\int_{\sqrt{\frac{\pi}{4}}}^{\sqrt{\frac{\pi}{2}}} x \sin(x^2) dx$

6. Write an integral that can be used to find the length of $y = \sqrt{2x + 3}$ on the interval $[1, 4]$ but do NOT evaluate it.

7. Find the average value of the function $f(x) = e^x$ over the interval $[0, \ln 3]$.

9. Let R be the region between $y = x^2$ and $y = 2x$. Be sure to show all work.

a) Find the points of intersection of the two graphs.



b) Sketch the region R on the axes provided. Pick appropriate scales for x and y.

c) Use cylindrical shells to find the volume of the solid generated when the region R is revolved about the x-axis.

10. Evaluate the integral: $\int \frac{2x+3}{x^2+3x-4} dx$.

11. Find the area bounded by $y = x^2 - 2x$ and $y = x + 4$.

12. Find $\frac{d}{dx} \int_2^{x^2} \sqrt{1-t} \, dt$.

13. Use disks or washers to find the volume when the region in the first quadrant bounded by $y = x$ and $y = x^3$, is revolved about the x-axis.

14. Evaluate the improper integral: $\int_2^3 \frac{1}{\sqrt{3-x}} dx$. State whether it converges or diverges.

15. Evaluate the integral: $\int \frac{dx}{x^2\sqrt{9-x^2}}$ using the (See p. 2 for relevant formulas.) Leave your final answer in terms of x .