2

1 . [4 marks] Using the limit of a Riem ann Sum, evaluate:

∫ (6𝑥

2 − 5)𝑑𝑥

4

0

NOTE: ∑ 𝑐 = 𝑐𝑛, ∑ 𝑖 =

𝑛 (𝑛 +1)

2

𝑛

𝑖 = 1

𝑛

𝑖 = 1

, ∑ 𝑖

2 =

𝑛 (𝑛 + 1) (2𝑛 +1)

6

𝑛

𝑖 =1

3

2. [25 marks] Find the following integrals:
a. ∫sec
4
(3𝑥)tan(3𝑥) 𝑑𝑥

b. ∫𝑥
2
ln𝑥 𝑑𝑥

7

3. [4 marks] Find the average value of 𝑓(𝑥)=𝑥√𝑥
2+36 over the interval [0,8]

4.

9

5. [8 marks] Evaluate the improper integral if it converges or show that it diverges

𝑎.) ∫

1

(𝑥 − 2)

2

𝑑𝑥

4ؒ楓怆ቩ占ؒ楓怆ቩ屰㝀

11
 6. [5 marks] Find the length of the curve 𝑦=18𝑥2−ln𝑥 over the interval [2,6]

12

 7. [5 marks] Find the area of the region bounded by the graphs of 𝑦=𝑥
2+2,𝑦=−𝑥
2+4
t

13

 8. [8 marks] Find the volume of the solid generated when the region bounded by
 𝑦=
𝑥
2
 and 𝑦=√𝑥 is rotated about
a.

15

 10. [4 marks] A population of whales grows at a rate
𝑑𝑃
𝑑𝑡
 =
2
3
𝑃
1/4
 , where 𝑡 is the time in years. How
many whales will there be in 38 years if there were 16 when 𝑡=0

18

 13. [4 marks] Find the radius of convergence and the open interval of convergence of the power series
 ∑
(𝑛+1)(𝑥+2)
𝑛
4
𝑛
∞
𝑛=1

19
 14. [4 marks] Find the 3
rd Taylor polynomial of the function 𝑓(𝑥)=13𝑥
+
2
 at 𝑥=1.

20

ANSWERS:
1. 108
2.
a.
1
12
sec
4
(3𝑥)+𝐶 𝑜𝑟
1
12
tan
4
(3𝑥)+
1
ଲ1