Name_____ Section_____

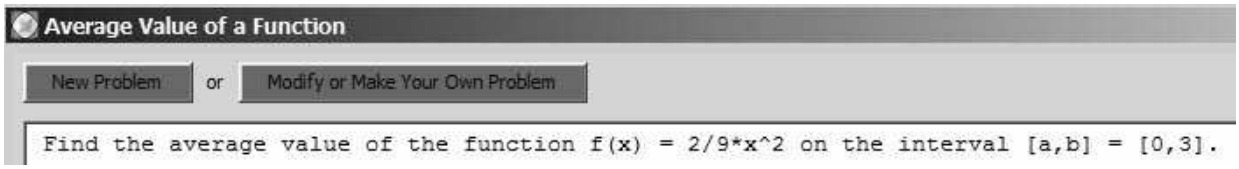
MATH 152H FINAL EXAM Spring 2016

Sections 201-202 P. Yasskin

Multiple Choice: (13 problems, 4 points each)

1-13	/52
14	/20
15	/20
16	/ 5
17	/ 5
18	/ 5
Total	/107

1.



a. $\frac{1}{6}$

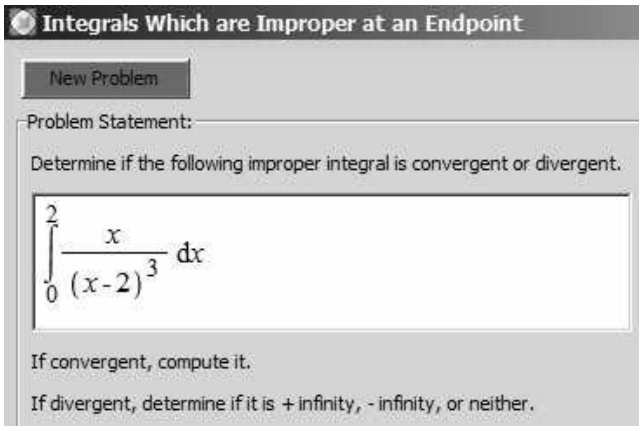
b. $\frac{1}{3}$

c. $\frac{2}{3}$

d. $\frac{4}{3}$

e. 2

2.



a. converges to $\frac{1}{4}$

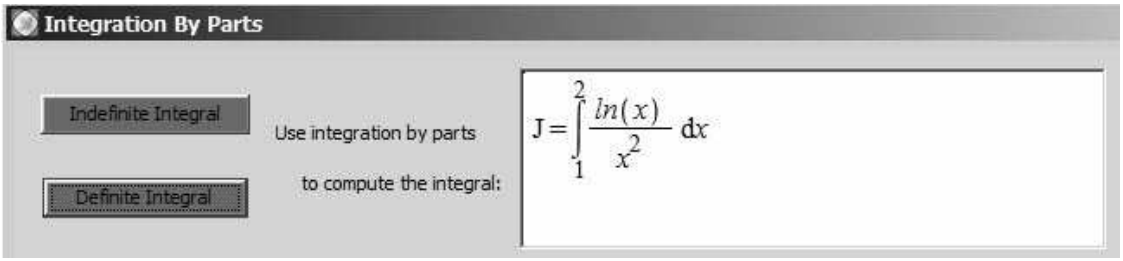
b. converges to $-\frac{1}{4}$

c. diverges to $-\infty$

d. diverges to ∞

e. diverges but not to $\pm\infty$

3.



a. $\frac{3 - \ln(2)}{2}$

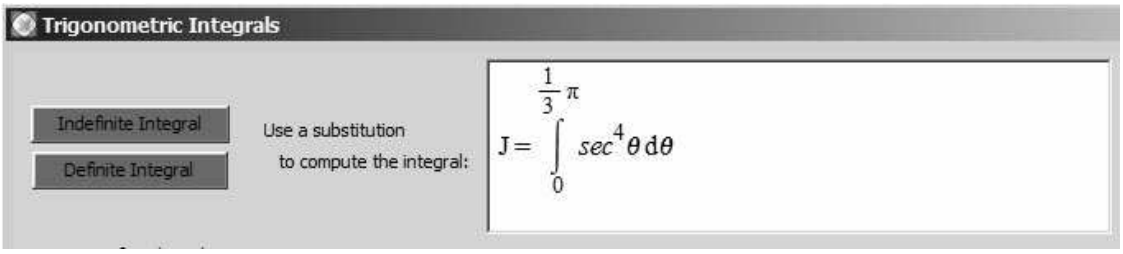
b. $\frac{\ln(2) - 3}{2}$

c. $\frac{\ln(2) - 1}{2}$

d. $\frac{-\ln(2)}{2}$

e. $\frac{1 - \ln(2)}{2}$

4.



a. $-2\sqrt{3}$

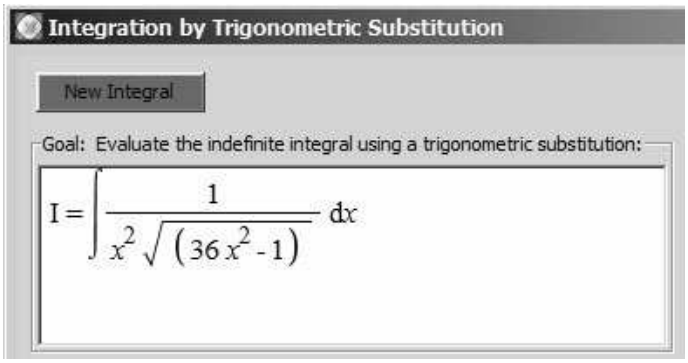
b. $2\sqrt{3}$

c. $-\frac{27}{5}$

d. $\frac{27}{5}$

e. $\frac{81}{5}\sqrt{3}$

5.



a. $\int \frac{36\cos^3\theta\,d\theta}{\sin\theta}$

b. $\int \frac{\cos^3\theta\,d\theta}{36\sin\theta}$

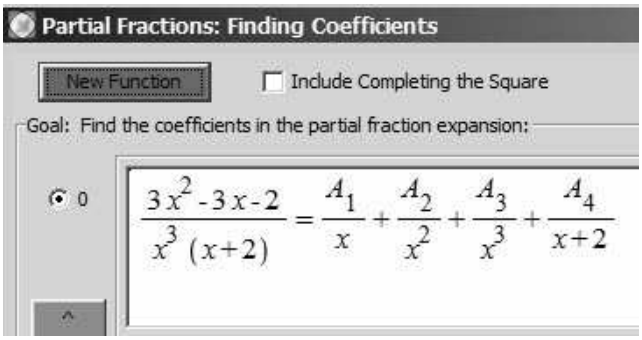
c. $\frac{1}{6}\int \cos\theta\,d\theta$

d. $\int \cos\theta\,d\theta$

e. $6\int \cos\theta\,d\theta$

Simply identify the integral after the substitution.

6.



a. $A_2 = -\frac{1}{2} \quad A_3 = -2$

b. $A_2 = \frac{1}{2} \quad A_3 = -2$

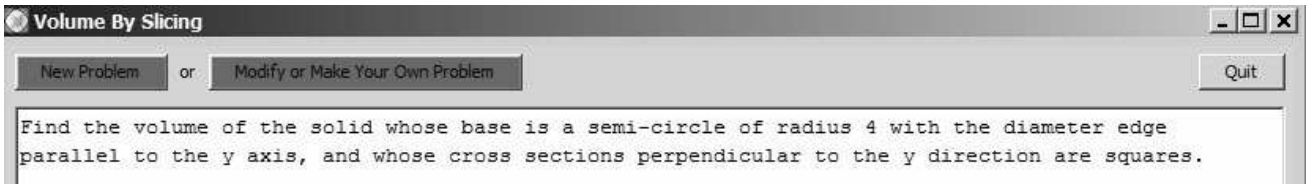
c. $A_2 = -1 \quad A_3 = -1$

d. $A_2 = 1 \quad A_3 = 1$

e. $A_2 = 1 \quad A_3 = -1$

Just find A_2 and A_3.

7.



a. $\frac{8}{3}$

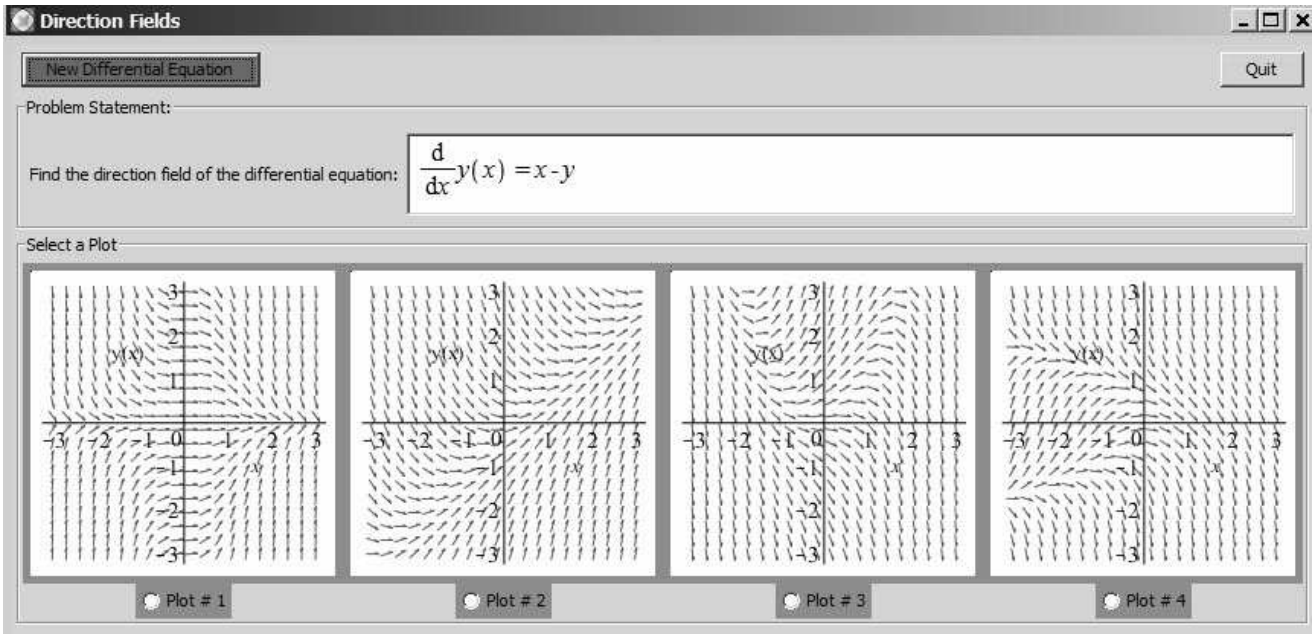
b. $\frac{128}{3}$

c. $\frac{256}{3}$

d. 8π

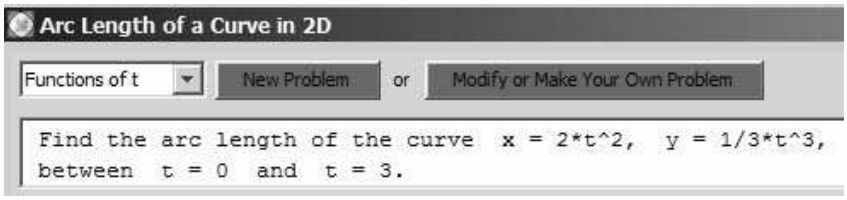
e. $\frac{128}{3}\pi$

8.



(**a**.) (**b**.) (**c**.) (**d**.)

9.



a. $\frac{31}{3}$

b. $\frac{61}{3}$

c. $\frac{64}{3}$

d. $\frac{122}{3}$

e. $\frac{125}{3}$

10. The function $y = \frac{x}{x^2+1}$ is a solution to which differential equation?

a. $\frac{dy}{dx} = \frac{y}{x^3+x} + y^2$

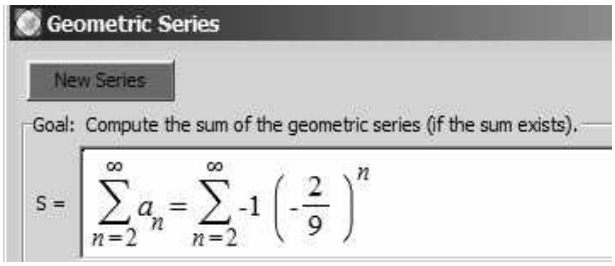
b. $\frac{dy}{dx} = \frac{y}{x^3+x} - y^2$

c. $\frac{dy}{dx} = \frac{y^2}{x^3+x} + y^2$

d. $\frac{dy}{dx} = \frac{y^2}{x^3+x} - y^2$

e. $\frac{dy}{dx} = -\frac{y}{x^3+x} + y^2$

11.



a. $-\frac{9}{7}$

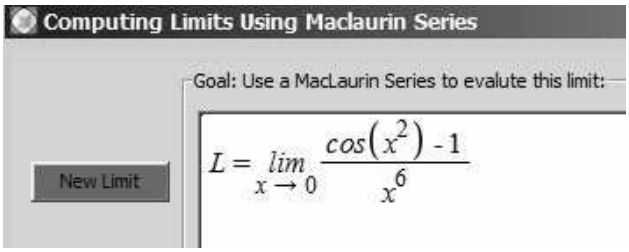
b. $-\frac{9}{11}$

c. $-\frac{4}{63}$

d. $-\frac{4}{99}$

e. diverges

12.



a. 0

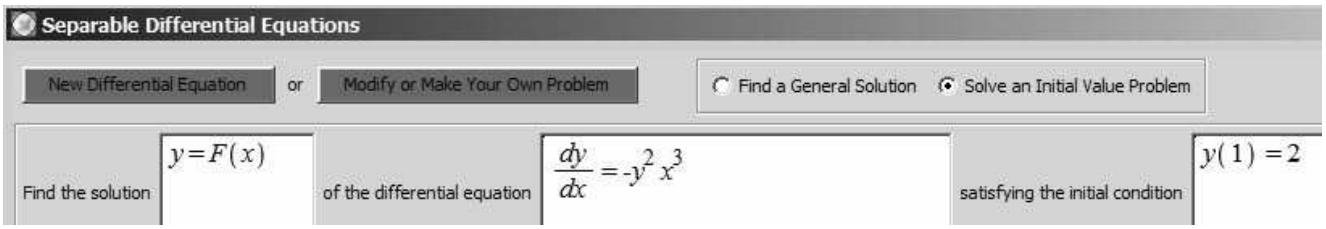
b. $\frac{1}{2}$

c. $\frac{1}{3}$

d. $\frac{1}{24}$

e. diverges

13.



a. $y = -\frac{4}{x^4} + 6$

b. $y = \frac{4}{x^4} - 2$

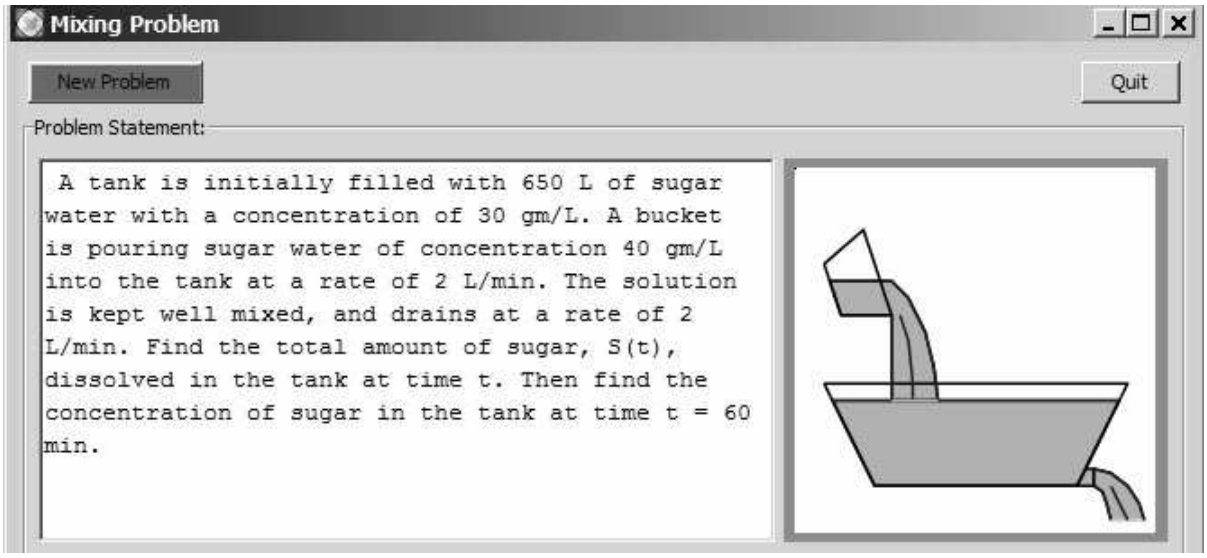
c. $y = \frac{4}{x^4 + 1}$

d. $y = \frac{4}{x^4 - 12}$

e. $y = \frac{4}{x^4} + \frac{3}{4}$

Work Out (5 questions, Points indicated. Show all you work.)

14. (20 points)

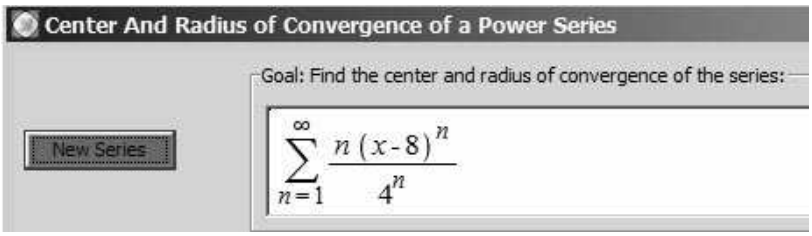


a. (8 pts) Write the differential equation and initial condition for $S(t)$.

b. (9 pts) Solve the initial value problem for $S(t)$.

c. (3 pts) Find the concentration in the tank at $t = 60$ min.

15. (20 points)



Also find the interval of convergence by checking the endpoints.

a. (2 pts) Identify the center: $a =$ _____

b. (8 pts) Find the radius of convergence:

$R =$ _____

c. (8 pts) Check the endpoints:

d. (2 pts) Summarize the interval of convergence: $I =$ _____

16. (5 points) Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^{1/3}}$ is absolutely convergent, convergent but not absolutely or divergent. Explain all tests you use.

17. (5 points) The series $S = \sum_{n=1}^{\infty} \frac{1}{n^2+1}$ converges by the Integral Test.

If it is approximated by its 100^{th} partial sum S_{100}, compute the integral bound on the error in this approximation.

18. (5 points) Compute the sum of the series $\sum_{n=0}^{\infty} \frac{(-1)^n \pi^{2n+1}}{(2n+1)!3^{2n+1}}$.