Name_____ ID_____

1-10	/50
11	/15
12	/10
13	/10
14	/15

MATH 172 EXAM 2 Fall 1998

Section 502 P. Yasskin

Multiple Choice: (5 points each)

1. Compute $\int_1^4 \frac{\ln x}{\sqrt{x}}\, dx$

a. $4\ln 4$
b. $4\ln 4 - 2$
c. $4\ln 4 - 4$
d. $4\ln 4 - 12$
e. $2\ln 2 - 8$

2. Approximate the integral $\int_0^6 x^3\, dx$ by using the Midpoint Rule with 3 rectangles with equal widths

a. 162
b. 306
c. 324
d. 360
e. 648

3. Compute $\int_0^{\pi/2} \sin^4\theta\cos\theta \; d\theta$

a. $-\frac{1}{3}$

b. $-\frac{1}{5}$

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

d. $\frac{1}{5}$

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

4. Compute $\int_0^{\pi/4} \tan^3\theta\sec^2\theta \; d\theta$

a. $-\frac{1}{4}$

b. $\frac{1}{4}$

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

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

e. $-\frac{1}{2}$

5. Compute $\int_e^{\infty} \frac{1}{x(\ln x)^2}\, dx$

a. $-\infty$

b. $-\frac{1}{e}$

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

d. 1

e. ∞

6. Compute $\int_1^{e} \frac{1}{x(\ln x)^2}\, dx$

a. $-\infty$

b. -1

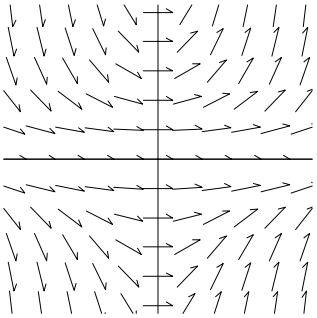
c. $\frac{1}{e}$

d. 1

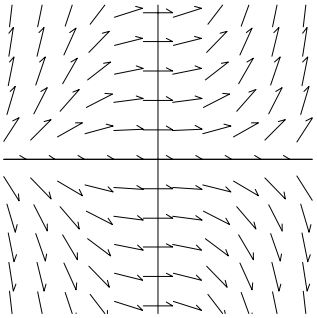
e. ∞

7. Which of the following is the direction field of the differential equation $\frac{dy}{dx} = x^2y$?

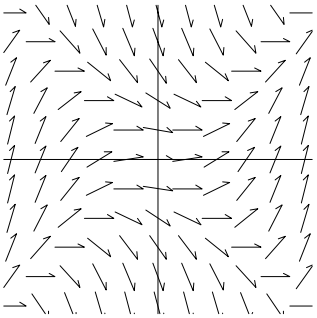
a.



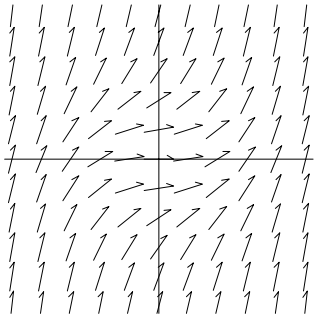
b.



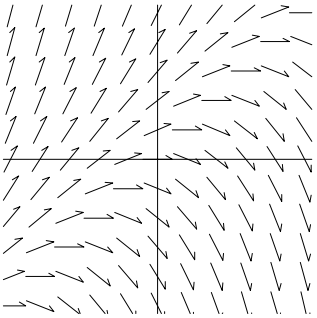
c.



d.



e.



8. Given that the partial fraction expansion of $\frac{1-x^2}{x^2(1+x^2)}$ is

$\frac{1-x^2}{x^2(1+x^2)} = \frac{1}{x^2} - \frac{2}{1+x^2}$, compute: $\int \frac{1-x^2}{x^2(1+x^2)}\,dx$

a. $-\frac{1}{2x} + C$

b. $-\frac{2}{x^3} + \frac{4x}{(1+x^2)^2} + C$

c. $\ln x^2 - \ln(1+x^2) + C$

d. $\ln x^2 - 2\ln(1+x^2) + C$

e. $-\frac{1}{x} - 2\arctan x + C$

9. Solve the differential equation $\frac{dy}{dx} = xy^2 + y^2$ with the initial condition $y(0) = 2$. Then find $y(1)$.

a. -1

b. 0

c. 1

d. $-\frac{2}{3}$

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

10. Solve the differential equation $\frac{dy}{dx} - \frac{y}{x} = 2x^2$ with the initial condition $y(1) = 3$. Then find $y(2)$.

a. 2

b. 4

c. 6

d. 8

e. 12

11. (15 points) Compute $\int_0^1 (t^2 - t)\, e^{2t}\, dt$

12. (10 points) Compute $\int_1^2 \frac{\sqrt{x^2-1}}{x}\,dx$

13. (10 points) Find the partial fraction expansion for $\dfrac{4x-6}{(x-1)^2(x^2+1)}$.

(Do not integrate.)

Hints: Try: $x = 1,$ $x = 0$ and $\dfrac{d}{dx}$.

14. (15 points) A tank initially contains 12L of sugar water with 8gm of dissolved sugar. Sugar water that contains 2gm of sugar per liter is poured into the tank at the rate of 3L/min. The solution is kept thoroughly mixed and drains from the tank at the rate of 3L/min. How much sugar is in the tank

(a) after t min (b) after 16min and (c) asymptotically after a large time?