Chapter 7 Calculus Practice Exam

1. Use the Fundamental Theorem of Calculus to evaluate $\int e^{x^2+\sin(x)}\,dx$

A. $\int_0^x (t^2 + \sin t)\,dt + C$ B. $\int_x^0 e^{t^2+\sin(t)}\,dt + C$

C. $(2x + \cos x)e^{x^2+\sin(x)} + C$ D. $\int_0^x e^{t^2+\sin(t)}\,dt + C$

E. $\int_0^x (2t + \cos t)e^{t^2+\sin(t)}\,dt + C$

1. ________________

2. Evaluate $\int e^{3x} - 4\cos x\,dx$

2.________________

3. Solve the initial value problem.

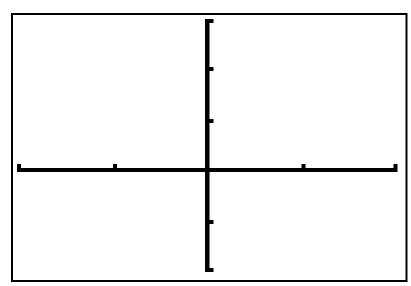
$\frac{dy}{dx} = 5x^2 - 7,\ y(0) = 1$

3.________________

4. Construct a slope field for the differential equation through the twelve lattice points shown in the graph.

$\frac{dy}{dx} = x + y$

4.



[-2,2] by [-2,3]

5. Use substitution to evaluate $\int \frac{(\ln x)^5 dx}{x}$

5.________________

6. Evaluate the definite integral by making a u-substitution and integrating from u(a) to u(b)

$\int_0^{\frac{\pi}{2}} \left(e^{\sin x} \cos x\right) \, dx.$

6.__________________

7. Use separation of variables to solve the initial value problem.

$\frac{dy}{dx} = \frac{\cos x}{3y^2}$ **; y (π) = 5**

7.__________________

8. Use integration by parts to evaluate $\int \cos^{-1} 2x \; dx$

8.__________________________

9. Evaluate $\int (4x^2 - 3x)e^x \quad dx$

9.__________________________

10. Evaluate $\int \mathbf{2\cos(\ln \mathit{t})}\ \boldsymbol{dt}$ by using a substitution **prior** to integration by parts.

10.__________________

11. Find the solution of the differential equation $\frac{dy}{dt} = ky$, k is a constant, that satisfies the given conditions. k = 1.5, y(0) = 100. Show your work.

11.____________________

12. Find the partial fraction decomposition.

$\frac{2x+16}{x^2+x-6}$

12. ______________________

13. Evaluate the integral.

$\int \frac{2x+16}{x^2+x-6}\ dx$

13.________________________

14. A population of wild horses is represented by the logistic differential equation $\frac{dP}{dt} = 0.08P - 0.00004P^2$, where t is measured in years.

a.) Find k and the carrying capacity for the population.

b.) The initial population is P(0) = 10 horses. Find a formula for the population in terms of t.

c.) When is the size of the population growing the fastest?

14a. k=___________________

carrying capacity= _______

14b.______________________

14c.______________________

15. Suppose Euler's method , with increment dx, is used to numerically solve the differential equation $\frac{dy}{dx} = f(x, y)$ with initial condition (x_0, y_0) lies on the solution curve. Let (x_1, y_1), (x_2, y_2), and so on denote the points generated by Euler's method, and let y = y(x) denote the exact solution to the initial value problem. Which of the following must be true?

I. $y_3 = y\,(x_3)$

II. $y_2 = y_1 + f(x_1, y_1)\,dx$

III. $x_3 = x_0 + 3dx$

A. II only B. I and II C. I and III

D. II and III E. I, II, and III

15._________________

16. Use Euler's method to numerically solve the initial value problem $y' = e^x - 10y$, y(2) = 3.5. Using dx = 0.1 find y (2.3). Show all steps leading to your answer and round y-values to the nearest 0.001.

16. ________________