Question 1(Multiple Choice Worth 10 points)

(07.05 MC)

What is a particular solution to the differential equation $\frac{dy}{dx} = x^5$, with the initial condition $y(0) = 5$?

- $y = 5 + \int_0^x t^5\,dt$
- $y = \int_5^x t^5\,dt$
- $y = \int_0^x 5t^5\,dt$
- $y = 5 + \int_x^0 t^5\,dt$

Question 2(Multiple Choice Worth 10 points)

(07.03 MC)

The table gives values of *f* and *f '* for selected values of *x*.

x	*f*(*x*)	*f '*(*x*)
2.6	3.4	1.68
2.8	3.736	18.32
3	?	21.798

Approximate *f*(3) using Euler's method with an equivalent step size based on this table of values. Round to the nearest hundredth.

- 6.46
- 7.36
- 7.40
- 8.10

Question 3(Multiple Choice Worth 10 points)

(06.04 MC)

A particle is traveling at a certain velocity modeled by $v(t)=\frac{1}{t}$, where t is measured in seconds and v is measured in inches per second. How far does the particle travel for $1 \le t \le 5$?

- ln(5) in.
- ln(4) in.
- $\frac{4}{5}$ in.
- 4 in.

Question 4(Multiple Choice Worth 10 points)

(06.02 MC)

A graph consists of the line $y = 2x - 4$ for $-2 \le x \le 2$ and $y = 2$ for $2 < x \le 4$. What is the accumulation of change from $x = -2$ to $x = 4$?

- 20
- 12
- –20
- −12

Question 5(Multiple Choice Worth 10 points)

(06.07 MC)

Which is an antiderivative of $\tan(x)\sec(x)$?

- $\sec(x) - 2$
- $\tan(x) + 6$
- $-\csc(x)$
- No antiderivative exists

Question 6(Multiple Choice Worth 10 points)

(08.02 MC)

At the time a hamburger is taken off the grill, its temperature is 200 degrees Fahrenheit. The hamburger's temperature then decreases at a rate of $H(t) = 27e^{-0.03t^2}$ degrees Fahrenheit per minute, where t is the time in minutes since the hamburger was taken off the grill. Which of the following integrals would give the temperature of the hamburger at $t = 4$ minutes?

- $200 - \int_1^4 H(t)dt$
- $200 - \int_0^4 H(t)dt$
- $200 + \int_0^4 H(t)dt$
- $200 + \int_1^4 H(t)dt$

Question 7(Multiple Choice Worth 10 points)

(07.05 MC)

What are all the solutions to the differential equation $\frac{dy}{dx} = \frac{3}{x+2}$?

- $y = 3\ln|x| + C$
- $y = 3\ln|x + 2| + C$
- $y = \ln|x + 2| + C$
- $y = 3\ln|x + 2 + C|$

Question 8(Multiple Choice Worth 10 points)

(06.09 MC)

$\int \frac{3x^2+6}{x^2+4}dx =$

- $3x+3\arctan\left(\frac{x}{2}\right)+C$
- $3x-3\arctan\left(\frac{x}{2}\right)+C$
- $3x+6\ln\left|x^2+4\right|+C$
- $3x-6\ln\left|x^2+4\right|+C$

Question 9(Multiple Choice Worth 10 points)

(08.03 MC)

Find the area between $y = 1$ and $y = 2\cos x + 5$ for $0 \le x \le \pi$.

- $4\pi - 4$
- $4\pi + 4$
- 4π
- 3π

Question 10 (Multiple Choice Worth 10 points)

(07.01 MC)

Select the possible solution(s) to the differential equation $(3-2a)\frac{da}{dt}=4$.

I. $\frac{3a-a^2+1}{4}=t$

II. $3t - 2at = 4t - C$

III. $3a - a^2 = 4a - 3$

- I
- III
- I and II
- II and III

Question 11 (Multiple Choice Worth 10 points)

(06.03 MC)

Use the trapezoidal rule to approximate $\int_0^2 x^4\,dx$, using three non-uniform partitions at {0, 0.25, 1.5, 2}.

- $(0^4 + 0.25^4)(1) + (0.25^4 + 1.5^4)(1) + (1.5^4 + 2^4)(1)$
- $0.5[(0^4 + 0.25^4)(0.5) + (0.25^4 + 1.5^4)(0.5) + (1.5^4 + 2^4)(0.5)]$
- $(0^4 + 0.25^4)(0.25) + (0.25^4 + 1.5^4)(1.25) + (1.5^4 + 2^4)(0.5)$
- $0.5[(0^4 + 0.25^4)(0.25) + (0.25^4 + 1.5^4)(1.25) + (1.5^4 + 2^4)(0.5)]$

Question 12(Multiple Choice Worth 10 points)

(06.10 MC)

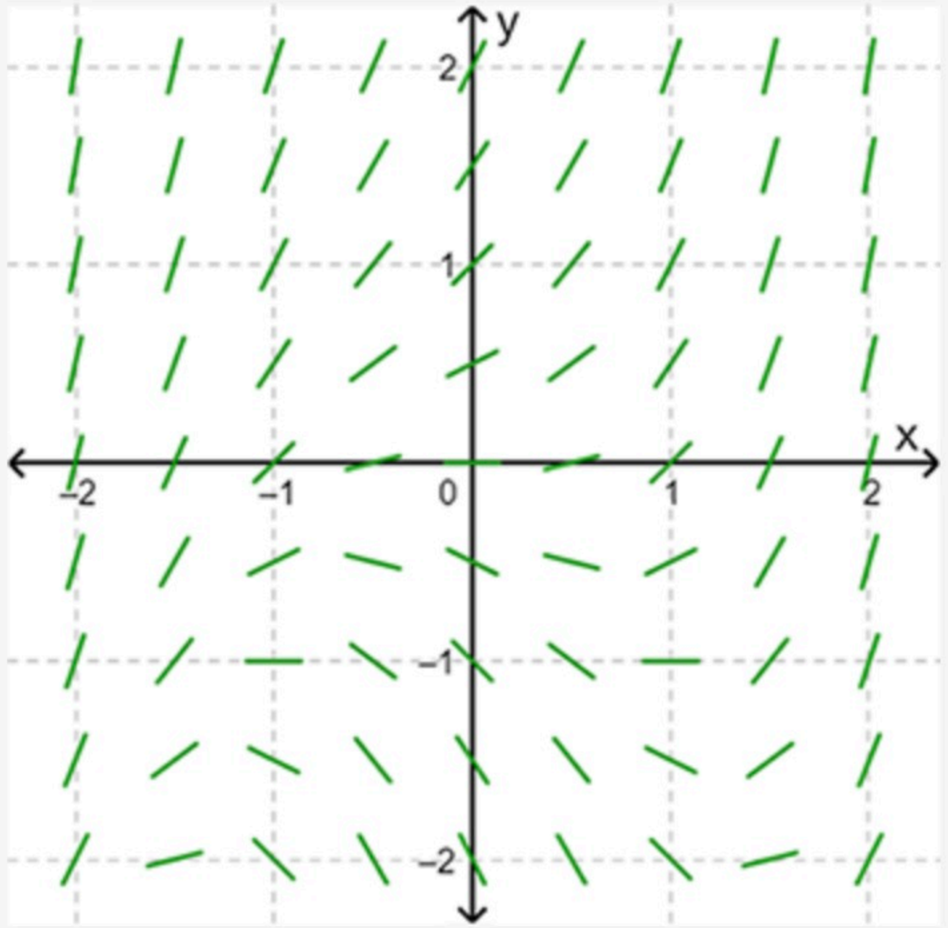
$\int 2x\sin(4x)dx =$

- $2x\cos 4x - \frac{1}{2}\int \cos 4x\, dx$
- $-2x\cos 4x + \frac{1}{2}\int \cos 4x\, dx$
- $-\frac{1}{2}x\cos 4x + \frac{1}{2}\int \cos 4x\, dx$
- $\frac{1}{2}x\cos 4x + \frac{1}{2}\int \cos 4x\, dx$

Question 13(Multiple Choice Worth 10 points)

(07.02 MC)

A slope field for which of the following differential equations is shown?



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

Question 14(Multiple Choice Worth 10 points)

(07.06 MC)

During flu season, the number of people that contract the flu virus at any time increases at a rate proportional to the number of people that contract the flu virus at that time. There were 700 people that contracted the virus when flu season began, and 1,025 contracted it seven days later. How many people contracted the virus 14 days after it first began? Round to the nearest person.

- 1,350
- 1,501
- 1,751
- 2,198

Question 15(Multiple Choice Worth 10 points)

(07.07 MC)

Determine $\lim_{t \to \infty} F(t)$ for $F(t)$ if F is a solution to the logistic differential equation $\frac{dF}{dt} = 0.2(4F - \frac{F^2}{2})$ with an initial value of $F(0) = 47$.

- 4
- 6.4
- 8
- 12.2

Question 16(Multiple Choice Worth 10 points)

(08.01 MC)

For time $t \geq 0$, the velocity of a particle moving along the x-axis is given by $v(t) = \sin(e^{0.8t})$. The initial position of the particle at time $t = 0$ is $x = 2.25$. What is the displacement of the particle from time $t = 0$ to time $t =$ 5?

- 0.790
- 3.040
- 3.389
- 5.639

Question 17(Multiple Choice Worth 10 points)

(06.05 MC)

Consider the function g that is continuous on the interval [−10, 10] and for which $\int_0^{10} g(x)dx = -11$. What is $\int_0^{10} [g(x)+3]dx$?

- 30
- 19
- −8
- −41

Question 18(Multiple Choice Worth 10 points)

(06.08 MC)

Evaluate $\int \sin(3x-5)\,dx$.

- $-\frac{1}{3}\sin(3x-5)+C$
- $\frac{1}{3}\sin(3x-5)+C$
- $\frac{1}{3}\cos(3x-5)+C$
- $-\frac{1}{3}\cos(3x-5)+C$