

Quiz 1 - Review of derivatives and integrals

Complete the following problems. You do not need to simplify. Show all work to receive full credit.

1. Calculate the following derivatives:

(a) $\frac{d}{dx} \left(x^5 + \frac{1}{x} - \frac{1}{\pi} \right)$

(b) $\frac{d}{dx} (x^2 \sec(2x + 3))$

(c) $\frac{d}{dx} \left(\frac{\tan x}{e^x + \pi^x} \right)$

2. Calculate the following integrals:

(a) $\int x^4 - \frac{7}{x} + \sin x \, dx$

(b) $\int \frac{\tan^{-1} x}{1 + x^2} \, dx$

Quiz 2 - Definite integrals

Complete the following problems. Show all work to receive full credit.

1. Calculate the following integrals:

(a) $\int_1^4 \frac{1}{t\sqrt{t}} \, dt$

(b) $\int_{-\frac{\pi}{3}}^0 \sec x \tan x \, dx$

(c) $\int_0^{\ln 9} e^\theta (e^\theta - 1)^{\frac{1}{2}} \, d\theta$

(d) $\int_1^3 \frac{(\ln(v + 1))^2}{v + 1} \, dv$

Quiz 3 - §§5.6 6.1

Complete the following problems. Show all work to receive full credit.

1. Find the area of the region between the curve $y = x^2$ and $y = -2x^4$ from $x = -1$ to $x = 1$.
2. Find the volume of the solid generated by rotating the region between the curve $y = \frac{1}{2\sqrt{x}}$, $x = \frac{1}{4}$, and $x = 4$ about the x -axis.
3. Find the volume of the solid generated by rotating the region between $y = 4 - x^2$ and $y = 2 - x$ about the x -axis.

Quiz 4 - §§6.1, 6.2

Complete the following problems. Show all work to receive full credit.

1. Find the volume of the solid generated by revolving the region in the first quadrant bounded by the curve $x = y - y^3$ about the x -axis
2. Find the volume of the solid generated by revolving the region bounded by $y = \sqrt{x}$ and $y = \frac{x^2}{8}$ about the y -axis.

Quiz 5 - §6.3

Complete the following problems. Show all work to receive full credit.

1. Find the length of the curve $y = \sqrt{1 - x^2}$ from $x = -\frac{1}{2}$ to $x = \frac{1}{2}$
2. Find the length of the curve $x(t) = 8 \cos t + 8t \sin t$, $y(t) = 8 \sin t - 8t \cos t$ for $0 \leq t \leq \frac{\pi}{2}$

Quiz 6 - §6.6

Complete the following problems. Show all work to receive full credit.

1. If a force of 90 N stretches a spring 1 m beyond its natural length, how much work does it take to stretch the spring 5 m beyond its natural length?
2. A mountain climber is about to haul up a 50 m length of hanging rope. How much work will it take if the rope weighs 0.624N/m?

Notice that the following does NOT work because the weight of the rope changes as you pull it up - the rope you have already lifted is not still being lifted.

Quiz 7 - §7.1

Complete the following problems by calculating the integrals. Show all work to receive full credit.

1. $\int x2^{(x^2)} dx$

2. $\int_1^4 \frac{\ln 2 \log_2 x}{x} dx$

3. $\int \left(\frac{1}{3}\right)^{\tan t} \sec^2 t dt$

Quiz 8 - §7.2

Complete the following problems. Show all work to receive full credit.

1. Suppose that the bacteria in a colony can grow unchecked by the law of exponential change. The colony starts with 1 bacterium and doubles every half-hour. How many bacteria will the colony contain at the end of 24 hours?
2. A colony of bacteria is grown under ideal conditions in a laboratory so that the population increases exponentially with time. At the end of 3 hours, there are 10,000 bacteria, and at the end of 5 hours there are 40,000. How many bacteria were present initially?

Quiz 9 - §8.1

Complete the following problems by computing the following integrals. Show all work to receive full credit.

1. $\int \sqrt{1 - \cos^2 x} \, dx$

2. $\int \frac{2}{x\sqrt{1 - 4\ln^2 x}} \, dx$

3. $\int \frac{2}{x^2 - 6x + 10} \, dx$

Quiz 10 - §8.2

Complete the following problems by computing the following integrals. Show all work to receive full credit.

1. $\int (x^2 - 5x)e^x \, dx$

2. $\int e^x \sin x \, dx$

3. $\int \tan^{-1} x \, dx$

Quiz 11 - §8.3

Complete the following problems by computing the following integrals. Show all work to receive full credit.

1. $\int \frac{8}{x^3(x^2 + 1)} \, dx$

2. $\int \frac{1}{x^2 - 3x + 2} \, dx$

Quiz 12 - §8.4

Complete the following problems by computing the following integrals. Show all work to receive full credit.

1. $\int_0^{\frac{\pi}{2}} 35 \sin^4 x \cos^3 x \, dx$

2. $\int 6 \tan^4 x \, dx$

3. $\int \sqrt{\sec^2 x - 1} \, dx$

Quiz 13 - §8.5

Complete the following problems by computing the following integrals. Show all work to receive full credit.

1. $\int \frac{\sqrt{x^2 - 49}}{x} \, dx$

2. $\int \frac{6}{(9x^2 + 1)^2} \, dx$

Quiz 14 - §8.8

Complete the following problems by solving the following differential equations. Show all work to receive full credit.

1. $\frac{dy}{dx} = \sqrt{y} \cos^2 \sqrt{y}$

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

Quiz 15 - §9.1

Complete the following problems by solving the following differential equations. Show all work to receive full credit.

1. $(t-1)^3 \frac{ds}{dt} + 4(t-1)^2 s = t+1, \quad t > 1$

2. $\frac{dy}{dx} + xy = x \quad y(0) = -6$

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

Quiz 16 - §9.2

Complete the following problems by solving the following differential equations. Show all work to receive full credit.

1. $(t-1)^3 \frac{ds}{dt} + 4(t-1)^2 s = t+1, \quad t > 1$

2. $\frac{dy}{dx} + xy = x \quad y(0) = -6$

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

Quiz 17 - Polar equations

Complete the following problems. Show all work to receive full credit.

1. Convert the polar equation $r = \csc \theta e^{r \cos \theta}$ to a Cartesian equation.

2. Convert the Cartesian equation $x^2 - y^2 = 1$ to a polar equation.

3. Find the length of the curve $r = 1 + \cos \theta \quad 0 \leq \theta \leq 2\pi$.

Quiz 18 - Review for Exam 2

Complete the following problems by completing the following integrals. Show all work to receive full credit.

1. $\int_0^3 \frac{3}{x-1} dx$

2. $\int x^2 \sin(1-x) dx$

Quiz 20 - §§11.1, 11.2

Complete the following problems. Show all work to receive full credit.

1. Does the sequence $a_n = \frac{(-1)^{n+1}}{2n-1}$ converge or diverge? If it converges, find its limit. Explain your reasoning.

2. Does the sequence $a_n = \sqrt[n]{4^n n}$ converge or diverge? If it converges, find its limit. Explain your reasoning.

3. Does the sequence $a_n = \ln n - \ln(n+1)$ converge or diverge? If it converges, find its limit. Explain your reasoning.

4. Does the series $\sum_{n=0}^{\infty} \left(\frac{1}{\sqrt{2}}\right)^n$ converge or diverge? If it converges, find its sum. Explain your reasoning.

5. Does the series $\sum_{n=1}^{\infty} \left(1 - \frac{1}{n}\right)^n$ converge or diverge? If it converges, find its sum. Explain your reasoning.

Quiz 21 - §§11.3 - 11.5

Complete the following problems by deciding whether or not the following series converge. Show all work and state which test you are using to receive full credit.

1.
$$\sum_{n=2}^{\infty} \frac{1}{(\ln n)^2}$$

2.
$$\sum_{n=1}^{\infty} \frac{(n+1)(n+2)}{n!}$$

3.
$$\sum_{n=1}^{\infty} \left(1 + \frac{1}{n}\right)^n$$

Quiz 22 - §11.6

Complete the following problems. Show all work to receive full credit. Determine whether the following series converge absolutely, converge conditionally or diverge.

1.
$$\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{n^3 + 1}$$

2.
$$\sum_{n=1}^{\infty} (-1)^n \frac{\tan^{-1} n}{n^2 + 1}$$

Quiz 23 - §11.7

Complete the following problems. Show all work to receive full credit. Determine where the following power series converge absolutely, converge conditionally or diverge. Indicate the center of convergence and the radius of convergence.

1.
$$\sum_{n=1}^{\infty} \frac{3^n x^n}{n!}$$

2.
$$\sum_{n=1}^{\infty} n^n x^n$$