Calculus 2
Final Exam

Calculus 2 Final Exam

This exam is comprehensive over the entire course and includes 12 questions. You have 60 minutes to complete the exam.

The exam is worth 100 points. The 8 multiple choice questions are worth 5 points each (40 points total) and the 4 free response questions are worth 15 points each (60 points total).

Mark your multiple choice answers on this cover page. For the free response questions, show your work and make sure to circle your final answer.

1. (5 pts) A   B   C   D   E

2. (5 pts) A   B   C   D   E

3. (5 pts) A   B   C   D   E

4. (5 pts) A   B   C   D   E

5. (5 pts) A   B   C   D   E

6. (5 pts) A   B   C   D   E

7. (5 pts) A   B   C   D   E

8. (5 pts) A   B   C   D   E

1. **(5 pts)** Evaluate the integral.

$$\int 2x \sin x \; dx$$

A	$\sin x - 2x \cos x + C$		D	$2x \sin x + \cos x + C$
B	$x \cos x + 2 \cos x + C$		E	$x \cos x + \sin x + C$
C	$2 \sin x - 2x \cos x + C$			

2. **(5 pts)** Approximate the area under the curve using the midpoint rule with four equal subintervals on the interval $[2,10]$.

$$f(x) = 2x^3 - 7x^2 + 2x - 6$$

A	186	C	1,342	E	1,324
B	2,684	D	2,648		

3. **(5 pts)** Find the work done to stretch the spring 3 feet beyond its natural length. A force of 100 lbs is required to keep a spring stretched $1/2$ foot beyond its natural length.

| A | 900 ft-lbs | D | 450 ft-lbs |

| B | 200 ft-lbs | E | 600 ft-lbs |

| C | 1,800 ft-lbs |

4. **(5 pts)** Find a formula for the general term of the sequence.

$$\left\{ \frac{1}{3}, \ -\frac{4}{4}, \frac{9}{5}, \ -\frac{16}{6} \right\}$$

| A | $a_n = (-1)^n \dfrac{2n}{3n+1}$ | D | $a_n = (-1)^{n-1} \dfrac{n^2}{2n+1}$ |

| B | $a_n = (-1)^{n+1} \dfrac{n^2}{n+2}$ | E | $a_n = (-1)^n \dfrac{n^2}{n+2}$ |

| C | $a_n = (-1)^{n+1} \dfrac{2n}{3n+1}$ |

5. **(5 pts)** Find the distance between the polar points.

$$\left(1, \frac{3\pi}{4}\right) \text{ and } \left(4, \frac{\pi}{2}\right)$$

A	$\sqrt{17 + 4\sqrt{2}}$		D	3
B	5		E	$\sqrt{17 - 4\sqrt{2}}$
C	$\sqrt{9 - \frac{\pi^2}{16}}$			

6. **(5 pts)** Find the sum of the geometric series.

$$\sum_{n=0}^{\infty} \frac{4^{n-2}}{3^{2n}}$$

A	$\frac{9}{80}$		D	The sum can't be found
B	$\frac{5}{144}$		E	$\frac{9}{40}$
C	$\frac{1}{10}$			

7. **(5 pts)** Find the area between the curves.

$$x = (y - 1)^2 + 1$$

$$y^2 = 6 - x$$

A $\dfrac{265}{3}$ C -9 E -3

B 9 D 3

8. **(5 pts)** Find the length of the parametric curve on $2 \leq t \leq 5$.

$$x = 2e^{6t} - 3t + 6$$

$$y = 4e^{3t} - 1$$

A $2e^{30} - 2e^{15} + 9$ D $2e^{18} + 9$

B $2e^{30}$ E $2e^{30} - 2e^{12} + 9$

C $2e^{30} + 15$

9. **(15 pts)** Find the surface area generated by revolving the curve around the x-axis over $-2 \leq x \leq 1$.

$$y = \sqrt{16 - x^2}$$

10. **(15 pts)** Use trigonometric substitution to simplify the integral, but don't evaluate it.

$$\int \frac{4x}{\sqrt{3 + 16x^2}}\, dx$$

11. **(15 pts)** Find the volume of revolution of the parametric curve on the interval $-\pi/2 \leq t \leq \pi/2$ about the y-axis.

$$x = 2\cos t$$

$$y = 5\sin t$$

12. **(15 pts)** Find the radius of convergence of the Taylor series.

$$5 + \frac{1}{2}(x-5) + \frac{1}{3}(x-5)^2 + \frac{1}{4}(x-5)^3$$