Calculus 2
Final Exam

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MATH

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

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

$$\int x^3 + \frac{x}{4} + \frac{2}{x} + 5 \; dx$$

A $\frac{x^4}{4} + \frac{x^2}{8} + 2\ln x + 5x$

B $\frac{x^4}{4} + \frac{x^2}{8} + 2\ln x + 5x + C$

C $\frac{x^4}{4} + \frac{x^2}{2} - \frac{4}{x^2} + 5x$

D $\frac{x^4}{4} + \frac{x^2}{2} - \frac{4}{x^2} + 5x + C$

E $x^3 + \frac{x}{4} + \frac{2}{x} + 5$

2. **(5 pts)** Use Simpson's rule to approximate the area under the curve when $n = 4$.

$$\int_2^3 3x^2 \; dx$$

A 19

B 18.5

C -18.25

D -18.5

E 18.25

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3. **(5 pts)** Evaluate the integral.

$$\int 3(3x+4)^4\,dx$$

A $\frac{1}{5}(3x+4)^5+C$

B $\frac{1}{15}(3x+4)^5+C$

C $\frac{3}{5}(3x+4)^5+C$

D $\frac{1}{4}(3x+4)^4+C$

E $\frac{3}{4}(3x+4)^4+C$

4. **(5 pts)** Evaluate the integral.

$$\int_0^{\pi} e^x \sin x\,dx$$

A $2(1+e^{\pi})$

B $2(1-e^{\pi})$

C $\frac{1}{2}(1+e^{\pi})$

D $\frac{1}{2}(1-e^{\pi})$

E e^{π}

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

$$\int \frac{1}{x^2\sqrt{x^2-25}}\,dx$$

A $\frac{x-5}{25x}+C$

B $5x+C$

C $\frac{25x}{\sqrt{x^2-25}}+C$

D $\frac{\sqrt{x^2-25}}{25x}+C$

E $\frac{25x}{x-5}+C$

6. **(5 pts)** Find the arc length of the curve on the interval $[1,4]$.

$$y=\frac{2}{3}(x-1)^{\frac{3}{2}}$$

A 6

B $\frac{3}{14}$

C $\frac{16}{3}$

D $\frac{14}{3}$

E $\frac{3}{16}$

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7. **(5 pts)** Find the work required for a rope weighing 3 lbs/ft to pull a 300 lb load up a shaft that is 600 ft deep.

A	180,000 ft-lbs	C	540,000 ft-lbs	E	720,000 ft-lbs
B	360,000 ft-lbs	D	558,000 ft-lbs		

8. **(5 pts)** Find the area under the parametric curve over $0 \leq t \leq 3$.

$$f(t) = 3t^2$$

$$g(t) = t - 3$$

A	-54	C	27	E	135
B	-27	D	54		

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9. **(15 pts)** Find the area between the curves $y = 3x^2 + x - 2$ and $y = x + 1$.

10. **(15 pts)** Find the volume of the solid obtained by rotating the region enclosed by the curves $y = x^2 + 3$ and $y = x + 3$ about the x-axis.

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11. **(15 pts)** Find the area of the region enclosed by one loop of the curve $r = 4\sin 2\theta$.

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

$$\sum_{n=0}^{\infty} \frac{2^n}{(n+1)^2}(3x-1)^n$$

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