MTH 252Z
Midterm Review

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1. Find the most general antiderivative of $f(x) = 8x^9 - 3x^6 + 12x^3$.

2. Find the most general antiderivative of $f(t) = \sin t + 2\cos t$.

3. Find f if $f'(t) = 5t^4 - 3t^2 + 4$ and $f(-1) = 2$.

4. Find f if $f''(x) = 8x^3 + 5$ and $f(1) = 0$, $f'(1) = 8$.

5. A particle is moving so that $a(t) = 3\cos t - 2\sin t$ with $s(0) = 0$ and $v(0) = 4$. Find the position of the particle.

6. Write a Riemann sum for $f(x) = \sin x$ on $0 \le x \le \frac{3\pi}{2}$ with six subintervals, taking sample points to be left endpoints, then find the sum.

7. Evaluate $\displaystyle\int_0^9 \sqrt{81 - x^2}\; dx$.

8. Evaluate $\displaystyle\int_{-1}^6 \left(|x - 4| - 1\right)\; dx$.

9. Estimate $\displaystyle\int_3^9 f(x)\; dx$ with three equal subintervals using

   (a) Right endpoints

   (b) Left endpoints

   where values of $f(x)$ are given in the table below.

x	3	4	5	6	7	8	9
$f(x)$	-3.4	-2.1	-0.6	0.3	0.9	1.4	1.8

10. Evaluate $\displaystyle\int \sec(x)\tan(x)\; dx$.

11. Evaluate $\displaystyle\int_0^{\frac{\pi}{6}} \sec(x)\tan(x)\; dx$.

12. Evaluate $\displaystyle\int 3x^2 e^{-x^3}\; dx$.

13. Evaluate $\displaystyle\int_0^{\frac{\pi}{4}} \sin x \sin(\cos x)\; dx$.

14. Evaluate $\displaystyle\int_{-31415926}^{31415926} \frac{x^5 \sin x \tan x |x|}{12 + x^2 + x^8}\; dx$.

15. Evaluate $\displaystyle\int \frac{\ln x}{x\sqrt{1 + (\ln x)^2}}\; dx$.

16. Evaluate $\displaystyle\int \frac{3t^2 - 2}{t^3 - 2t - 8}\; dt$.

17. Evaluate $\dfrac{d}{dx} \displaystyle\int_0^x \sqrt[5]{t^2 + t + 1}\ dt.$

18. Evaluate $\dfrac{d}{dx} \displaystyle\int_0^{\sin x} \sqrt[5]{t^2 + t + 1}\ dt.$