Math 182 Honors Exam 1 Version A

1. $\dfrac{d}{dx}\sin(e^{-x^2})$

2. $\dfrac{d}{dx}\ln\sqrt{\dfrac{4+x^2}{4-x^2}}$

3. $\dfrac{d}{dx}|x|^3$

4. $\dfrac{d}{dx}\dfrac{\cosh x}{x^2+1}$

5. $\displaystyle\lim_{n\to\infty} n \ln\left(1 + \frac{1}{3n}\right)$

6. $\displaystyle\lim_{n\to\infty}\left(1 + \frac{1}{n^2}\right)^n$

7. $\displaystyle\lim_{x\to 0}\frac{\tan^3 x}{x^2}$

8. $\displaystyle\lim_{h\to 0} 4e^{(h+\ln 3)}$

    (A) 7

    (B) 12

    (C) $4e$

    (D) $4\ln 3$

    (E) none of these.

9. $\displaystyle\int \ln(3x + 4)\, dx$

10. $\displaystyle\int x\cos(x^2 + 1)\, dx$

11. $\displaystyle\int_0^1 (x^2 + 1)^2\, dx$

12. $\displaystyle\int \frac{e^x\, dx}{e^x + 1}$

13. Sketch $y = x^2 - 4x$ and $y = 2x$ and find the area of the region they bound.

14. Find the volume of the solid of revolution generated when the area bounded by the curves $y = \sqrt{x}$, $y = 0$ and $x = 4$ is revolved about the x-axis.

15. Find the length of the specified arc of the curve $y = \frac{1}{3}\sqrt{x}(3-x)$ between $0 \le x \le 3$.

16. Find the area of the surface of revolution generated by revolving $y = \frac{1}{3}\sqrt{x}(3-x)$ between $0 \le x \le 3$ about the x-axis.

17. [Extra Credit] $\dfrac{d}{dx}\tanh^{-1}(5x+7)$

18. [Extra Credit] $\displaystyle\int_0^1 \sqrt{x^2+1}\,dx$