

- Please put your name, ID number, and section number (or time) on your blue book.
- The exam is CLOSED BOOK.
- Calculators are NOT allowed.
- **You must show your work to receive credit.**

1. (48 pts.) Evaluate the following. Remember to show your work!

(a)  $\lim_{x \rightarrow 0} \frac{\cos x - 1}{e^x - 1}$ .

(b)  $F'(x)$  given that  $F(x) = \int_{\sqrt{x}}^2 \cos(t^2) dt$ .

(c)  $\int e^t \sqrt{1 + e^t} dt$ .

(d)  $\int_0^2 |x - 1| dx$ .

2. (20 pts.) (a) Verify that  $\ln |\sin u|$  is an antiderivative of  $\cot u$ .

(b) Compute  $\int_{\pi/4}^{\pi/2} \cot x dx$ .

Your final answer may contain logarithms,  
but it should NOT contain trig functions.

3. (12 pts.) Verify the inequality  $\int_0^1 \sqrt{2 + x^2} dx \leq \sqrt{3}$  without evaluating the integral.

4. (a) (15 pts.) Given the table of information below, use a linear approximation to estimate  $g(16)$ .

$x$	0	5	10	15
$g(x)$	0	20	35	45

(b) (5 pts.) Do you think your prediction is an overestimate or underestimate? Why? You must give a reason to receive credit.

**END OF EXAM**