

Name:

Math 115 Exam 3

December 1, 2022

1. WRITE YOUR NAME ON THIS TEST!
2. Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer.
3. Unless indicated, DO NOT convert irrational numbers such as $\sqrt{3}$ or π into decimal approximations; just leave them as they are.
4. If you have a question, raise your hand or come up and ask me.

1) Find the absolute maximum and minimum of the function $f(x) = x \cos(x) - \sin(x)$ on the interval $[-4, 5]$.

2) Let $g(x, y) = 6xy - 3x - 2y$.

a) Find all critical points of g .

b) Let T be the triangle with vertices $(-1, 0)$, $(1, 0)$, and $(0, 1)$ and let \mathcal{D} be the region in the xy -plane consisting of all points either inside or on T . Are any of the points you found in a) in the region \mathcal{D} ?

c) Does g have an absolute maximum on \mathcal{D} ? If not, explain why not, and if so, describe how you would find the maximum of g on \mathcal{D} WITHOUT doing any calculations.

3) Resolve the following integrals:

a) $\int_{-6}^6 \sqrt{36 - x^2} \, dx$

b) $\int e^x \cdot \cos(e^x) \, dx$

c) $\frac{d}{dx} \int_1^{x^7} \ln(\sqrt{t} + 1) \, dt$