

Math 220 GE1 Practice Exam

1) Evaluate the following integrals.

(a) $\int_0^{4\pi} \sin(x) + 5x^{3/2} dx$

(b) $\int \frac{dt}{t \ln t}$

(c) $\int_0^2 \frac{e^{4x}}{3 + e^{2x}} dx$

2) (6 points) State the formal and the second version of the Fundamental Theorem of Calculus.

3) Let $F(x) = \int_{-3}^x f(t) dt$. The graph of $f(x)$ is given below. Answer the following questions about F. Justify your answers.

Here was a picture of some function $f(x)$. Make up your own.

(a) Where is $F(x)$ increasing?

(b) Where is $F(x)$ concave down?

(c) Where does $F(x)$ have stationary points?

(d) Where does $F(x)$ have a local minimum?

(e) Suppose $G(-3) = 2$ and $G'(x) = f(x)$. How are the graphs of F and G related? If any constants or stretching factors are involved, be specific!

4) The graph of $f(x)$ is given below.

Make up your own function over an interval $[0, 6]$.

(a) Approximate $\int_1^5 f(x) dx$ by a right sum with four equal subintervals.
Does this sum over-estimate the actual value of the integral?

(b) Find upper and lower bounds for $\int_0^6 f(t) dt$.

5) Let $f(x) = \cos(x^2) + 3$. Write $\int_0^4 f(x) dx$ as a limit of *left* Riemann sums.
Express your answer in sigma notation.

6) Evaluate the following limit. Use the interval $[0, 2]$.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{2(2i)^{1/2}}{n^{3/2}}$$

7) Sketch the region bounded below by $y = x$ and above by $y = 4 - x^2$. Find its area.