

Math 2250, Spring 2017, Practice Sheet Exam 3

1. Find the absolute minimum and maximum values of the function $f(x) = 2x^2 - 3x + 1$ on the interval $[-2, 3]$.
2. Find the absolute minimum and maximum values of the function $f(x) = 2x^2 - 3x + 1$ on the interval $[-2, \infty)$.
3. Suppose you are constructing a box with a square base and no top (that is, it has a square bottom and 4 rectangular sides) which will have a volume of 200 in^3 . What dimensions should you construct the box in order to minimize the total surface area?
4. Compute the following limits

(a) $\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x}$

(b) $\lim_{x \rightarrow \infty} \frac{3x^2 - 3x + 2}{(4 - x)(2x - 8)}$

(c) $\lim_{x \rightarrow 0} \frac{2 \sin x - \sin 2x}{x - \sin x}$.

5. Calculate the following definite integrals

(a) $\int_3^7 5dx$

(b) $\int_0^3 xdx$

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

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

(e) $\int_0^3 (xe^{x^2} + 3)dx$

6. Calculate the following indefinite integrals

(a) $\int 4\sqrt{x} dx$

(b) $\int 4\sqrt{x-4} dx$

(c) $\int 4 \sin(x) \sqrt{3 + \cos(x)} dx$

(d) $\int \frac{\ln(\sqrt{x})}{x} dx$

(e) $\int 4 \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$

(f) $\int \arcsin x dx$ (hint: set $u = \arcsin x$)

7. Approximate the integral $\int_2^4 (2x + 3) dx$ using 4 rectangles and left endpoints

8. Compute the area bounded by the graph of $y = \sin x$ and the x -axis, for $0 \leq x \leq \pi/4$.

9. Suppose that $F(x) = \int_0^x \sqrt{4 + 3t^2} dt$. Compute $F'(4)$.

10. Suppose that $G(x) = \int_0^{x^2} \sqrt{4 + 3t^2} dt$. Compute $G'(2)$.