Review Problems for Test I

math 2423-001

1. Estimate the area under the graph \( f(x) = x^3 + 2 \) from \( x = -1 \) to \( x = 2 \) using three rectangles and right endpoints.

2. Find the limit
   a) \( \lim_{n \to \infty} \sum_{i=1}^{n} \frac{10}{n} \sin\left(\frac{10\pi i}{n}\right) \);
   b) \( \lim_{n \to \infty} \sum_{i=1}^{n} \frac{6}{n} (7 + \frac{18i}{n}) \).

3. Find the definite and indefinite integrals
   a) \( \int_{1}^{4} \sqrt{t} - \frac{2}{\sqrt{t}} dt \);
   b) \( \int_{0}^{2} (x^2 - |x - 1|) dx \);
   c) \( \int \frac{\cos(\pi/x)}{x^2} dx \);
   d) \( \int_{0}^{4} x \sqrt{16 - 3x} dx \).

4. Find the area of the region bounded by the curves.
   a) \( y = \sin x, \ y = -\cos x, \ x = 0, \ x = \pi \);
   b) \( x - 2y + 7 = 0, \ y^2 - 6y - x = 0 \).

5. Find the volume of a solid obtained by rotating the region bounded by the given curves about the specified axis.
   a) \( x = y^2, \ x = 1 \) about \( x = 2 \);
   b) \( y = x^2, \ y^2 = x \) about \( x\)-axis;
   c) \( y^2 - 6y + x = 0, \ x = 0 \) about \( x\)-axis.

6. (problem 29 a) p.402) A tank full of water has the shape of a paraboloid of revolution, that is its shape is obtained by rotating a parabola about a vertical axis. If its height is 4ft and the radius at the top is 4ft, find the work required to pump the water out of the tank.