

Name: _____

Each problem is worth the indicated number of points; show all your work (excluding arithmetic) for full credit.

1. (20 pts) Find the following indefinite integrals:

(a) $\int \frac{\sqrt[4]{x^7}}{13\sqrt{x^5}} dx$

(b) $\int \frac{2x^5+3x^2+5x}{x^3} dx$

(c) $\int \frac{x^2+10x-11}{x+11} dx$

(d) $\int \left((3 - \sqrt[4]{t})^2 (3 + \sqrt[4]{t})^2 \right) dt$

(e) $\int \frac{\sqrt{e^x}}{\sqrt[3]{e^x}} dx$

(f) $\int \ln \sqrt{\frac{5u^2-3}{\sqrt[4]{u^3+2u+3}}} dp$

2. (10 pts) Suppose the marginal profit to produce and sell q reams of paper is given by $MP(q) = 25 + \frac{50}{\sqrt{q}}$. Find

$$\int_{50}^{100} MP(q) dq$$

Give units and interpret your answer.

3. (10 pts) Suppose the depth of water in a marble quarry has been growing by $r(t) = 0.5 + 2.5\sqrt{t}$ ft/yr, where t is the number of years since the quarry was abandoned. Determine how deep the water is after 50 years, assuming the quarry was initially dry.

4. (10 pts) Find the exact value of the area underneath the graph of $f(x) = x^3 - 4x$ for $2 \leq x \leq 3$.

5. (10 pts) Approximate

$$\int_{-2}^3 [\ln(x+7)] dx$$

using a Rimeann sum with

(a) 5 subintervals

(b) 10 subintervals

For each approximation, write down the values of $a, b, n, \Delta x$, and x_0, \dots, x_{n-1} alongside the sum.