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Math 2020, Fall 2016, Test 1
September 20, 2016

Write clearly, label the problems and your answers, and leave space between problems. You may keep this list of questions.

1. (15 pts) Estimate $\int_0^2 \frac{1}{x^2+1}\,dx$ using the partition $0, 1, 2$ and
   (a) right hand endpoints
   (b) left hand endpoints

   What do these estimates tell you about the value of this integral?

2. (15 pts) Compute
   (a) $\int \frac{\cos(1+\frac{1}{x})}{x^2}\,dx$
   (b) $\int_0^1 (3x-1)^4\,dx$
   (c) $\int_{-1}^1 \sin(x) - x^9 + 2x^7 - x^5 + 4x^3 + x^2\,dx$

3. (10 pts) A 50 foot chain which weighs 100 pounds is hanging from the top of a building. How much work is required to lift it to the top of the building?

4. (10 pts) Compute
   (a) $\frac{d}{dx}\int \sqrt{\sin(x)}\,dx$
   (b) $\frac{d}{dx}\int_0^x e^{\cos(t)-\sin(t)}\,dt$

5. (10 pts) Find the area between $y = 4x$ and $y = x^3$ in the first quadrant.

6. (10 pts) If this area is revolved about the x-axis, find the volume of the resulting solid.

7. (10 pts) If this area is revolved about the y-axis, find the volume of the resulting solid.

——— Continued on reverse ———

8. (10 pts) What is the value of the constant function whose integral over the interval $[1, 5]$ is the same as the integral of x^2 over $[1, 5]$?

9. (10 pts) If $\int_0^2 f(x)\,dx = 4$, $\int_2^5 f(x)\,dx = 9$, and $\int_0^5 g(x)\,dx = 12$, find

   (a) $\int_0^5 f(x)\,dx$ and

   (b) $\int_0^5 f(x) - g(x)\,dx$.

——— The End ———