

**Quiz 8 — 11/02/17**

Name: \_\_\_\_\_ Section and/or TA: \_\_\_\_\_

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (2 points) Find the integral that gives the arc length of the curve  $f(x) = \ln(1 - x)$  for  $-10 \leq x \leq -5$ . **Do NOT evaluate the integral.**

**Solution:**  $f'(x) = \frac{1}{(1-x)^2}$ , so

$$L = \int_{-10}^{-5} \sqrt{1 + (f'(x))^2} dx = \int_{-10}^{-5} \sqrt{1 + \frac{1}{(1-x)^4}} dx$$

2. (1 point) Find the arc length of the curve  $y = x + 1$  for  $0 \leq x \leq 4$ .

**Solution:**  $f'(x) = 1$ , so

$$L = \int_0^4 \sqrt{1 + 1} dx = 4\sqrt{2}$$

3. (2 points) Find the integral that gives the surface area when the curve  $f(x) = \frac{1}{x}$ ,  $1 \leq x \leq 5$  is rotated about the  $x$ -axis. **Do NOT evaluate the integral.**

**Solution:**  $f'(x) = -\frac{1}{x^2}$ , so

$$SA = \int_1^5 2\pi f(x) \sqrt{1 + (f'(x))^2} dx = \int_1^5 \frac{2\pi}{x} \sqrt{1 + \frac{1}{x^4}} dx$$