

Math 116 Final Fall 16 Answers

1) a) $(18,0)$

b) $(6, -\pi/6)$ and $(-6, 5\pi/6)$ are two possible answers

2) $\frac{\pi}{4}$

3) a) $t = 2$

b) $\langle 1/4(1 - t \ln(2) - t), t/2 \rangle$

4) a) $\int_2^4 \sqrt{4t + (t-1)^2} dt$

b) 8

5) a) $c = 2$

b) $1/2$

c) $9/4, 7/4$ are two such points

6) a) $\lim_{x \rightarrow \infty} \int_0^x f(t) dt$

b) If $\lim_{x \rightarrow a} f(x) = \lim_{x \rightarrow a} g(x) = 0$ or $\lim_{x \rightarrow a} f(x) = \pm\infty$ and $\lim_{x \rightarrow a} g(x) = \pm\infty$, then

$$\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}.$$

c) $\frac{1}{w} + \frac{1}{w^2}$ ($w > 0$)

7) a) $\sum_{n=1}^{\infty} a_n = \lim_{k \rightarrow \infty} S_k$ where $S_k = \sum_{n=1}^k a_n$.

b) 1

8) Note $f(x) = e^{-3x}$, then check.

9) a) $x(0) = 4$

b) $\frac{dx}{dt} = 2 - \frac{x(t)}{50}$

10) a) $\frac{1}{2} \left(\frac{1}{x+1} + \frac{3-x}{x^2+1} \right)$

b) $\frac{\ln(2)}{4} + \frac{3\pi}{8}$

11) a) $125/192$

b) e^{-2016}