Spring 2013 Math 152

Week in Review 5

courtesy: Amy Austin

(covering section 9.3, 9.4, 10.1)

Section 9.3

1. Find the length of the curve $y = 2x^{3/2}$, $0 \le x \le \frac{1}{4}$.

2. Find the length of the curve $x = y^2 - \frac{\ln(y)}{8}$ from $y = 1$ to $y = e$.

3. Find the length of the parametric curve $x = 3t - t^3$, $y = 3t^2$, $0 \le t \le 2$.

Section 9.4

4. Find the surface area obtained by revolving the given curve about the indicated axis.

   a.) $y = 2x^3$, $0 \le x \le 1$ about the x axis.

   b.) $y^2 = x + 2$, $1 \le y \le 3$ about the x axis.

   c.) $y = x^2 + 1$, $0 \le x \le 1$, about the y axis.

   d.) $y = \sqrt{4x}$, $0 \le x \le 1$, about the x axis.

   e.) $x = \ln(3y + 1)$, $0 \le y \le 2$, about the y axis, then the x axis. Set up the integral that gives the surface area. Do not integrate.

   f.) $x = \sin(3t)$, $y = \cos(3t)$, $0 \le t \le \frac{\pi}{12}$. about the y axis.

Section 10.1

5. Find the fourth term of the sequence $\{\frac{n}{n+1}\}_{n=2}^{\infty}$

6. Find a general formula for the sequence
   $\frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \ldots$

7. Find a general formula for the sequence
   $-\frac{1}{3}, \frac{1}{7}, -\frac{1}{11}, \frac{1}{15}, \ldots$

8. Determine whether the following sequences converge or diverge. If the sequence converges, find the limit. If the sequence diverges, explain why.

   a.) $a_n = \dfrac{n^3}{n^2 + 500n - 2}$

   b.) $a_n = \ln(2n + 1) - \ln(5n + 4)$

   c.) $a_n = \dfrac{5\cos n}{n}$

   d.) $a_n = \dfrac{(-1)^n}{n}$

   e.) $a_n = \dfrac{(-1)^n n}{5n + 6}$

   f.) $a_n = \dfrac{(\arctan n)^5}{n^2}$

   g.) $a_n = \sqrt{n^2 + 4n} - n$

9. Prove the sequence $a_n = \dfrac{\ln n}{n}$ is a decreasing sequence.

10. For the recursive sequence given, find the 3rd term and find the value of the limit.
    $a_1 = 2$, $a_{n+1} = 2 + \frac{1}{4}a_n$.