1620 1/13 Recitation

1. Evaluate $\int_{\ln 2}^{\ln 3} \frac{e^{2x}}{e^{2x}-1}dx$.

2. Evaluate $\int_{\frac{1}{2}}^{1} 8x^{-2}(1+\frac{1}{x})^{-3}dx$.

3. Sketch a curve of $y = f(x)$ where:
(a) f is continuous everywhere
(b) $f'(x) > 0$ on $(-\infty, 1)$, $f'(x) < 0$ on $(1, \infty)$, and $f'(1) = 0$
(c) $f''(x) > 0$ on $(-\infty, -2) \cup (2, \infty)$, $f''(x) < 0$ on $(-2, 2)$
(d) $\lim\limits_{x\to-\infty} f(x) = -\infty$, $\lim\limits_{x\to\infty} f(x) = 1$
(e) $f(-3) = -2$, $f(1) = 2$

4. Let $g(x) = \int_{\sqrt{x}}^{1} \cos(t^2)dt$ be defined on $(0, 2\pi)$. Find the intervals of increasing and decreasing of g.

5. If $f(x) = 10 + \int_9^{x^2} \sin(\frac{\pi\sqrt{t}}{2})dt$, what is $f(3)$ and $f'(3)$?

6. A terabyte of data contains 2^{40} bytes. Use linearization to approximate 2^{40} without a calculator. (Hint: Use $f(x) = x^4$ and that $2^{10} = 1024$.)

7. Express $\int_1^4 (x^2 - 4x + 2)dx$ as a limit of Reimann sums, and then evaluate the limit. (Hint: Recall that $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$ and $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$.)

8. $\int_a^b f(x)dx$ can be interpreted as the net area contained between f and the x-axis for $a \le x \le b$. How would you interpret $\int_c^d f(y)dy$? Use this interpretation to determine the area of the region below where the curve is given by $x = \sec^2 y \tan^3 y$.