Math 172 Exam 2 Review

Do the following problems the textbook: *Section 9.1 # 2,5,7,8,10,12,18 (cf. Hmwk 7)*

1. Determine whether the given integral is convergent or divergent.

   (a) $\displaystyle\int_1^\infty \frac{4 + \cos^4 x}{x}\, \mathrm{d}x$

   (b) $\displaystyle\int_0^\infty \frac{1}{\sqrt{x} + e^{4x}}\, \mathrm{d}x$

2. Evaluate $I = \displaystyle\int_0^{2012} \frac{1}{\sqrt{2012 - x}}\, \mathrm{d}x$.

3. Set up, *but don't evaluate* the integral for the length of the curve $x = 2t^2, \quad y = t^3, \quad 0 \le t \le 1$.

4. Find length of the curve $y = \frac{1}{\pi}\ln(\sec(\pi x))$ from the point $(0,0)$ to the point $\left(\frac{1}{6}, \ln\frac{2}{\sqrt{3}}\right)$.

5. Write out the form of the partial fraction decomposition (do not try to solve)

$$\frac{20x^3 + 12x^2 + x}{(x^3 - x)(x^3 + 2x^2 - 3x)(x^2 + x + 1)(x^2 + 9)^2}$$

6. Evaluate the integral $\displaystyle\int \frac{5x^2 + x + 12}{x^3 + 4x}\, \mathrm{d}x$

7. A tank contains 250 liters of pure water. Brine that contains 0.01 kg of salt per liter enters the tank at a rate of 20 liters per minute. The solution is kept mixed and drains from the tank at a rate of 20 liters per minute. How much salt is in the tank after t minutes?

8. What is the smallest value of n so that the approximation T_n (the trapezoidal rule with n subintervals) to the integral $\int_1^3 \ln x \, \mathrm{d}x$ is accurate to within $\frac{1}{2400}$?