A Pactice Midterm II[1]

1. (15 points) Let $f(x) = A\sin(Bx)+C$, with A, B, C constants. Suppose that the maximum of $f(x)$ is 3, the minimum of $f(x)$ is 1 and the period of $f(x)$ is 4π.

   (a) (10 points) Find A, B, C.

   (b) (5 points) Find the amplitude and frequency of $f(x)$.

2. (20 points) Find the derivatives of the following functions.

   (a) $\sin(2x)\cos(4x)$

   (b) x^2e^x

   (c) $x^2(x^3 + 1/x)$

   (d) $x\sin x$

3. (20 points) Find the local maxima and minima of $f(x) = x + 1/x^3$. Clearly show how you apply the second derivative test.

4. (15 points) Let $f(x) = \sin(2x + \pi/3)$. Find the linear approximation of $f(x)$ at $x = 0$.

5. (15 points) Car A starts in Sacramento at 11am. It travels along a 400 mile route to Los Angeles at 60 mph. Car B starts from Los Angeles at noon and travels to Sacramento along the same route at 75 mph. The route goes past Fresno which is 150 miles along the route from Los Angeles. How far from Fresno are the cars when they meet?

6. (15 points) A rectangular box has volume 20 cubic meters. The base of the box is a square. The top and the base of the box are made from material which costs \$30 per square meter. The material for the sides costs \$20 per square meter. Express the total cost of the box in terms of the length of edge of the base.

[1] http://www.math.ucsb.edu/~xichen/math34b02w/p2.pdf