Math 152 Lab 2

Use Python to solve each problem.

1) Evaluate the following integrals.

   (a) $\int \frac{x^3}{5+8x^4}dx$

   (b) $\int\limits_0^{\frac{3\pi}{4}} |\sin(2x) - \cos(2x)|dx$. (Give exact and approximate answers)

2) Let $f(x) = \frac{\sqrt{x}}{(\sqrt{x}+1)^6}$.

   (a) Find $\int f(x)dx$.

   (b) Use part (a) and the Fundamental Theorem of Calculus to evaluate $\int\limits_0^1 f(x)dx$.

   (c) Check your answer from part (b) by directly evaluating the definite integral $\int\limits_0^1 f(x)dx$.

3) (a) Compute the following integrals to show that they are all equal.

   i. $\int\limits_0^1 e^{-\sqrt{x}}\, dx$

   ii. $\int\limits_0^{\frac{\pi}{2}} e^{-\sin x} \sin 2x\, dx$

   iii. $\int\limits_0^1 2xe^{-x}\, dx$

   (b) In a print statement, indicate what substitutions you can make on the first two integrals to obtain the third integral in both cases. (You do not have to compute the integrals using these substitutions, but you should state what u and du would be equal to.)

4) Given $f(x) = \ln x$ and $g(x) = x^2 - 6x + 5$:

   (a) Graph both functions on the interval $0.5 \le x \le 6$ on the same set of axes.

   (b) Find the points of intersection (approximate if necessary)

   (c) Find the area of the region enclosed by these curves (approximate if necessary).