AP Calculus Homework 11

Please write your answer on a separate piece of paper and submit it on Classkick or write your answer directly on Classkick.

Please write all answers in exact forms. For example, write π instead of 3.14.

Questions with a * are optional. Questions with ** are optional and more challenging.

1. Evaluate the integral.

a) $\int x^2 \sin(\pi x)dx$ b) $\int (\ln x)^2 dx$ c) $\int e^{2\theta}\sin(3\theta)d\theta$

d) $\int_0^1 (x^2+1)e^{-x}dx$ e) $\int_4^9 \frac{\ln y}{\sqrt{y}}dy$ f)* $\int_0^1 \frac{y}{e^{2y}}dy$

g)* $\int_1^{\sqrt{3}} \arctan(1/x)dx$ h)* $\int \cos x \ln(\sin x)dx$ i)** $\int_0^1 \frac{r^3}{\sqrt{4+r^2}}dr$

j)** $\int_0^t e^s \sin(t-s)ds$

2.* If $f(0) = g(0) = 0$, and f'' and g'' are continuous, show that

$$\int_0^a f(x)g''(x)dx = f(a)g'(a) - f'(a)g(a) + \int_0^a f''(x)g(x)dx$$

3. Suppose that $f(1) = 2$, $f(4) = 7$, $f'(1) = 5$, $f'(4) = 3$, and f'' is continuous. Find the value of $\int_1^4 xf''(x)dx$.

4. $\int x\sec x dx =$

(A) $x\tan x + C$ (B) $\frac{x^2}{2}\tan x + C$ (C) $\sec^2 x + 2\sec^2 x\tan x + C$

(D) $x\tan x - \ln|\cos x| + C$ (E) $x\tan x + \ln|\cos x| + C$

5. $\int x\sin 2x dx =$

(A) $-\frac{x}{2}\cos 2x + \frac{1}{4}\sin 2x + C$ (B) $-\frac{x}{2}\cos 2x - \frac{1}{4}\sin 2x + C$

(C) $\frac{x}{2}\cos 2x - \frac{1}{4}\sin 2x + C$ (D) $-2x\cos 2x + \sin 2x + C$

(E) $-2x\cos 2x - \sin 2x + C$