Practice Problems 2

Remember to practice using correct notation!

1. Find the average of the function f over the indicated interval $[a,b]$:

a) $f(x)=6-2x$, $[1,5]$ **b)** $f(x)=3x^2-2x+2$, $[0,2]$ **c)** $f(x)=4xe^{x^2}$, $[0,2]$

2. Sketch the graphs of $f(x)$ and $g(x)$ and draw the region enclosed by these graphs and the lines $x=a$ and $x=b$. Find the area of this region.

(a) $f(x)=x^2+x-6$, $g(x)=0$; $a=-3$, $b=1$.
(b) $f(x)=x^3$, $g(x)=0$; $a=-1$, $b=2$.
(c) $f(x)=3x-x^2$, $g(x)=0$; $a=-2$, $b=1$.
(d) $f(x)=9-x^2$, $g(x)=-x-5$; $a=-1$, $b=2$.
(e) $f(x)=x^2-5x+4$, $g(x)=2$; $a=2$, $b=3$.

3. Sketch the graph and find the area of the region completely enclosed by the graphs of the functions $f(x)$ and $g(x)$.

(a) $f(x)=x^2-1$, $g(x)=2x+7$.
(b) $f(x)=x^2+5x-6$, $g(x)=0$.
(c) $f(x)=-x^2+2x$, $g(x)=x$.
(d) $f(x)=x^2-3x-4$, $g(x)=-6x+6$.
(e) $f(x)=-x^2+4x$, $g(x)=2x-3$.

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5. Find each integral (definite or indefinite).

a) $\int xe^{-2x}dx$ **b)** $\int 7xe^{4x}dx$ **c)** $\int (e^x-2x)^2dx$ *(hint : expand first)*

d) $\int e^{4x}(x-5)dx$ **e)** $\int 2x\ln x^3\,dx$ **f)** $\int x^{3/2}\ln\sqrt{x}\,dx$

g) $\int \frac{\ln x}{\sqrt{x}}\,dx$ **h)** $\int \sin(\ln x)\,dx$ **i)** $\int 2e^x\cos x dx$

j) $\int_0^3 xe^{-x}dx$ **k)** $\int_1^2 x\ln x\,dx$ **l)** $\int_1^3 \ln x\,dx$

6. Questions from Part B and Part C of Integration of Rational Expressions by Partial Fractions handout.

7. Use the trapezoidal rule and Simpson's rule to approximate the value of each definite integral. For parts **a)**, **b)** and **c)** compare your result with the exact value.

a) $\int_0^4 e^{-2x}dx$, $n=8$ **b)** $\int_1^4 (x^2-2)dx$ $n=6$ **c)** $\int_1^2 \frac{1}{x}dx$ $n=6$

d) $\int_0^2 \sqrt{x}e^{-x}dx$ $n=4$ **e)** $\int_2^3 \frac{1}{\sqrt{4x^2-1}}dx$ $n=4$ **f)** $\int_2^4 \frac{1}{\ln x}\,dx$ $n=4$