PRACTICE1 **Math 152 - Section 99999 Summer 2001**

Homework Set Hmwk2 due 4/12/09 at 6:00 AM

This problem set covers sections 5.5-5.8 of the text.

You may need to give 4 or 5 significant digits for some (floating point) numerical answers in order to have them accepted by the computer.

1.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

The integral $\int_{-1}^{4} \left|9x^2 - x^3 - 14x\right| \, dx$ MUST be evaluated by breaking it up into a sum of three integrals:

$$\int_{-1}^{a} \left|9x^2 - x^3 - 14x\right| \, dx +$$
$$\int_{a}^{c} \left|9x^2 - x^3 - 14x\right| \, dx +$$
$$\int_{c}^{4} \left|9x^2 - x^3 - 14x\right| \, dx$$

where

a = ______

c = ______

$\int_{-1}^{a} \left|9x^2 - x^3 - 14x\right| \, dx$ = ______

$\int_{a}^{c} \left|9x^2 - x^3 - 14x\right| \, dx$ = ______

$\int_{c}^{4} \left|9x^2 - x^3 - 14x\right| \, dx$ = ______

Thus $\int_{-1}^{4} \left|9x^2 - x^3 - 14x\right| \, dx$ = ______

This is similar to Problems 29, 30, 33 and 34 of Section 5.5 of the text. It is also essential to understanding the notation of Section 5.8.

2.(1 pt) **Note:** You can get full credit for this problem by just entering the answer to the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the indefinite integral $\int \cos^{11}(5t)\sin(5t)\,dt$

Then the most appropriate substitution to simplify this integral is

u = ______ Then $dt = f(t)\,du$ where

$f(t)$ = ______

After making the substitution we obtain the integral $\int g(u)\,du$ where

$g(u)$ = ______

This last integral is: = ______ $+C$

(Leave out constant of integration from your answer.)

After substituting back for u we obtain the following final form of the answer:

= ______ $+C$

(Leave out constant of integration from your answer.)

This is similar to Problems 6 and 7 of Section 5.6 of the text.

3.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the indefinite integral $\int x^4 \left(3 + 12x^5\right)^{10} dx$

Then the most appropriate substitution to simplify this integral is

u = ______

Then $dx = f(x)\,du$ where

$f(x)$ = ______

After making the substitution we obtain the integral $\int g(u)\,du$ where

$g(u)$ = ______

This last integral is: = ______ $+C$

(Leave out constant of integration from your answer.)

After substituting back for u we obtain the following final form of the answer:

= ______ $+C$

(Leave out constant of integration from your answer.)

This is similar to Problems 19 and 20 in Section 5.6 of the text.

4.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the indefinite integral $\int \frac{1}{3x+4\sqrt{x}}\,dx$

Then the most appropriate substitution to simplify this integral is

u = ______

Then $dx = f(x)\,du$ where

$f(x)$ = ______

After making the substitution and simplifying we obtain the integral $\int g(u)\,du$ where

$g(u)$ = ______

This last integral is: = ______ $+C$

(Leave out constant of integration from your answer.)

After substituting back for u we obtain the following final form of the answer:

= ______ $+C$

(Leave out constant of integration from your answer.)

This is similar to Problem 18 in Section 5.6 of the text.

5.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit. Also the appropriate way to enter roots (except sqrt) into WeBWorK is to use fractional exponents.

Consider the definite integral $\int_0^1 \frac{dx}{\sqrt{x}+8\sqrt[3]{x}}$

Then the most appropriate substitution to simplify this integral is

u = ______

Then $dx = f(x)\,du$ where

$f(x)$ = ______

After making the substitution and simplifying we obtain the integral $\int_a^b g(u)\,du$ where
$g(u)$ = ______
a = ______
b = ______
This definite integral has value = ______
This is analogous to Problem 18 in Section 5.6 of the text.

6.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the definite integral $\int_{\pi/6}^{\pi/2} \frac{\cos(z)}{\sin^6(z)}\,dz$

Then the most appropriate substitution to simplify this integral is
u = ______
Then $dz = f(z)\,du$ where
$f(z)$ = ______
After making the substitution and simplifying we obtain the integral $\int_a^b g(u)\,du$ where
$g(u)$ = ______
a = ______
b = ______
This definite integral has value = ______
This is similar to Problem 34 in Section 5.6 of the text.

7.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the definite integral $\int_0^1 x^2\sqrt{5x+6}\,dx$

Then the most appropriate substitution to simplify this integral is
u = ______
Then $dx = f(x)\,du$ where
$f(x)$ = ______
After making the substitution and simplifying we obtain the integral $\int_a^b g(u)\,du$ where
$g(u)$ = ______
a = ______
b = ______
This definite integral has value = ______
This is similar to Problems 45-48 in Section 5.6 of the text.

8.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Consider the definite integral $\int \sqrt{7+6\sqrt{x}}\,dx$

Then the most appropriate substitution to simplify this integral is
u = ______
Then $dx = f(x)\,du$ where
$f(x)$ = ______
After making the substitution and simplifying we obtain the integral $\int g(u)\,du$ where
$g(u)$ = ______
This last integral has value = ______ $+C$
After substituting back for u we obtain the following final final form of the answer:
= ______ $+C$
This is similar to Problems 45-48 in Section 5.6 of the text.

9.(1 pt) **Note:** You can get full credit for this problem by just answering the last question correctly. The initial questions are meant as hints towards the final answer and also allow you the opportunity to get partial credit.

Find the area bounded by the two curves:

$$x = 100000\,(12\sqrt{y}-1)$$
$$x = 100000\left(\frac{12\sqrt{y}-1}{9\sqrt{y}}\right)$$

The appropriate definite integral for computing this area has integrand
______ ;
lower limit of integration = ______ ;
and upper limit of integration = ______
This definite integral has value = ______
This is the area of the region enclosed by the two curves.

This is similar to Problem 30 in Section 5.8 of the text. Note that since the graphs are given in the form x=f(y), x=g(y), the appropriate integral for computing this area has the general form

$$\int_a^b |f(y)-g(y)|\,dy$$

10.(1 pt) Evaluate the indefinite integral.

$$\int \frac{(\ln(x))^4}{x}\,dx$$

______ $+C$
This is similar to Problem 30 in Section 5.7 of the text.

11.(1 pt) Evaluate the indefinite integral.

$$\int \frac{\cos(x)}{2\sin(x)+12}\,dx$$

______ $+C$
This is similar to Problem 25 in Section 5.7 of the text.

12.(1 pt) Evaluate the indefinite integral.

$$\int \frac{x+4}{x^2+8x+17}\,dx$$

______ $+C$
This is similar to Problem 27 in Section 5.7 of the text.

13.(1 pt) Suppose that $f'(x)$ is continuous on the closed interval $[5,8]$, that $f(x) \neq 0$ on this interval, $f(5)=5$, $f(8)=8$, and

$$\int_5^8 f(x)\,dx = 15$$

Using this information find the values of the following definite integrals.
(a) $\int_{\sqrt[7]{5}}^{\sqrt[7]{8}} x^6 f(x^7)\,dx =$ ______
(b) $\int_{1/8}^{1/5} \frac{f(1/x)}{x^2}\,dx =$ ______

(c) $\int_{\ln(5)/8}^{\ln(8)/8} e^{8x} f\left(e^{8x}\right)\, dx =$ ______

(d) $\int_5^8 \frac{f'(x)}{f(x)}\, dx =$ ______

This is similar in spirit to Problems 62-66 of Section 5.6 of the text.

14.(1 pt) Evaluate the definite integral.

$$\int_1^{e^8} \frac{dx}{x(1+\ln x)}$$

______

This is similar to Problem 26 in Section 5.7 of the text.

15.(1 pt) Consider the function

$$f(x) = \begin{cases} x & \text{if } x < 1 \\ \frac{1}{x} & \text{if } x \geq 1 \end{cases}$$

Evaluate the definite integral.

$$\int_{-1}^{5} f(x)\, dx$$

______

This is similar to Problems 33 and 34 in Section 5.5 of the text.

16.(1 pt) Find the area between the curves:
$y = x^3 - 9x^2 + 14x$
and $y = -x^3 + 9x^2 - 14x$

______

This is similar to Problems 16 and 20 in Section 5.8 of the text.

17.(1 pt) Find the area of the region enclosed between $y = 2\sin(x)$ and $y = 3\cos(x)$ from $x = 0$ to $x = 1\pi$. Hint: Notice that this region consists of two parts.

______

This is similar to Example 1 in Section 5.8 of the text.

18.(1 pt) Consider the area between the graphs $x + 5y = 19$ and $x + 5 = y^2$. This area can be computed in two different ways using integrals

First of all it can be computed as a sum of two integrals

$$\int_a^b f(x)\, dx + \int_b^c g(x)\, dx$$

where $a =$ ______ , $b =$ ______ , $c =$ ______ and
$f(x) =$ ______
$g(x) =$ ______

Alternatively this area can be computed as a single integral

$$\int_\alpha^\beta h(y)\, dy$$

where $\alpha =$ ______ , $\beta =$ ______ and
$h(y) =$ ______
Either way we find that the area is ______ .

This is similar to examples 4 and 6 in section 5.8.

19.(1 pt) Consider the region bounded by the graphs of $y = 33\tan(x)$, $y = 28\cos(x)$, the x-axis and $x = 0$. To find the area of this region we first find the intersection point of the two graphs by setting $33\tan(x) = 28\cos(x)$ and solving for $\sin(x)$. We find that
$\sin(x) =$ ______
Thus the intersection point is
$x =$ ______
Hint: you can have WeBWorK compute the intersection point for you by entering the expression: asin("your first answer").

Thus the area to be computed can be expressed as the sum of two integrals:

$$\int_a^b f(x)\, dx + \int_b^c g(x)\, dx$$

where $a =$ ______ , $b =$ ______ , $c =$ ______ and
$f(x) =$ ______
$g(x) =$ ______

We find that the area of the region is
______ .