

ESP

Kouba

Worksheet 8

1.) The rate at which the amount of money in your savings account increases is proportional to the amount of money present. If you initially deposit \$750 (with no deposits thereafter), and after one year the amount of money has increased by 12%, how much money will be in your account after 20 years ?

2.) The amount of money in your savings account increases by 12% each year. If you initially deposit \$750 (with no deposits thereafter), how much money will be in your account after 20 years ?

3.) Use differentials to estimate each of the following.

a.) $f(1.01) - f(1)$, where $f(x) = \frac{\sqrt{x}}{1 + \sqrt{x}}$

b.) $g(\sqrt{\pi} + 1/10) - g(\sqrt{\pi})$, where $g(x) = \sin(x^2)$

c.) $h(7.99)$, where $h(x) = \frac{x^{1/3}}{1 + x}$

d.) $(33)^{1/5}$

4.) Let $G(x) = \int_0^{x^4} \arctan(t^{1/4}) dt$.

a.) Compute $G'(x)$.

b.) Give a good estimate for each of the following.

i. $G(1.01) - G(1)$

ii. $G(1.98) - G(2)$

iii. $G(\sqrt{3} + 1/100) - G(\sqrt{3})$

5.) Integrate.

a.) $\int e^x dx$

c.) $\int \frac{e^x}{1+e^x} dx$

e.) $\int \frac{1}{1+e^x} dx$

g.) $\int x^2 e^x dx$

i.) $\int x^2 e^{x^2} dx$

k.) $\int \sqrt{x} dx$

m.) $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

o.) $\int x \sqrt{1-x} dx$

q.) $\int \frac{1+\sqrt{x}}{\sqrt{x}} dx$

s.) $\int \frac{1}{\sqrt{x-1}} dx$

u.) $\int \frac{1}{|x| \sqrt{x^2-1}} dx$

w.) $\int \sin \theta d\theta$

b.) $\int \frac{1}{e^x} dx$

d.) $\int \frac{e^x+1}{e^x} dx$

f.) $\int x e^x dx$

h.) $\int x e^{x^2} dx$

j.) $\int x^2 e^{x^3} dx$

l.) $\int \frac{1}{\sqrt{x}} dx$

n.) $\int \sqrt{1-x} dx$

p.) $\int x \sqrt{1-x^2} dx$

r.) $\int \frac{(1+\sqrt{x})^{10}}{\sqrt{x}} dx$

t.) $\int \frac{1}{\sqrt{1-x^2}} dx$

v.) $\int \frac{x}{\sqrt{1-x^2}} dx$

x.) $\int \sin^4 \theta \cos \theta d\theta$

$$y.) \int (1 + \tan \theta)^2 d\theta$$

$$z.) \int \frac{\sec^2(\ln(e^{1+\sqrt{x}}))}{2\sqrt{x}} dx$$

6.) Assume that f'' is continuous, $f(0) = f(1)$, and $f'(1) = 3$. Evaluate

$$\int_0^1 x f''(x) dx.$$

7.) Find all functions $f(x)$ satisfying each of the following equations.

a.) $f'(x) = x [f(x)]^4$

b.) $f(x) = 3 \int_0^x f(t) dt.$