

**WS 2 – USUBSTITUTION 2****CALCULUS AB – show all work in your notebook**

INTEGRATE EACH.

1.  $\int \frac{x^2}{(16-x^3)^2} dx$

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

3.  $\int \frac{x^3}{\sqrt{1+x^4}} dx$

4.  $\int \left(1 + \frac{1}{t}\right)^3 \left(\frac{1}{t^2}\right) dt$

5.  $\int \left[ x^2 + \frac{1}{(3x)^2} \right] dx$

6.  $\int \frac{1}{\sqrt{2x}} dx$

7.  $\int \frac{x^2 + 3x + 7}{\sqrt{x}} dx$

8.  $\int \frac{t+2t^2}{\sqrt{t}} dt$

9.  $\int t^2 \left( t - \frac{2}{t} \right) dt$

10.  $\int \sec(1-x) \tan(1-x) dx$

11.  $\int \cos 3x dx$

12.  $\int \tan^4 x \sec^2 x dx$

13.  $\int \sqrt{\tan x} \sec^2 x dx$

14.  $\int \sin 2x dx$

15.  $\int \frac{\csc^2 x}{\cot^3 x} dx$

16.  $\int \frac{\sin x}{\cos^3 x} dx$

17. Find an equation for the function  $f$  if  $f'(x) = 2x(4x^2 - 10)^2$  and whose graph passes through the point  $(2, 10)$ .

INTEGRATE EACH.

18.  $\int x\sqrt{x+2} dx$

19.  $\int x\sqrt{2x+1} dx$

20.  $\int t \sqrt[3]{t-4} dx$

RECALL

21. The rate that water enters a container is recorded at the times below. At  $t = 0$  there is 50 gal of water in the container. Use a Riemann Sum with 3 subintervals to estimate the amount of water in the container after 30 seconds.

Time (min)	0	5	10	15	20	25	30
Rate (gal/min)	2	8	15	12	8	4	3

a. Right Hand

b. Mid Point

## ANSWERS

1.  $\frac{1}{3(16-x^3)} + C$

2.  $-\sqrt{1-x^2} + C$

3.  $\frac{1}{2}\sqrt{1+x^4} + C$

4.  $-\frac{1}{4}(1+\frac{1}{t})^4 + C$

5.  $\frac{x^3}{3} - \frac{1}{9x} + C$

6.  $\sqrt{2x} + C$

7.  $\frac{2}{5}\sqrt{x}(x^2+5x+35) + C$

8.  $\frac{2}{3}t^{3/2} + \frac{4}{5}t^{5/2} + C$

9.  $\frac{1}{4}t^4 - t^2 + C$

10.  $-\sec(1-x) + C$

11.  $\frac{1}{3}\sin 3x + C$



"Well, so much for the unicorns ... but, from now on, all carnivores will be confined to 'C' deck."

12.  $\frac{1}{5}\tan^5 x + C$

13.  $\frac{2}{3}(\tan x)^{3/2} + C$

14.  $-\frac{1}{2}\cos 2x + C$

15.  $\frac{1}{2}\tan^2 x + C$

16.  $\frac{1}{2}\sec^2 x + C$

17.  $f(x) = \frac{1}{12}(4x^2 - 10)^3 - 8$

18.  $\frac{2}{15}(x+2)^{3/2}(3x-4) + C$

19.  $\frac{1}{15}(2x+1)^{3/2}(3x-1) + C$

20.  $\frac{3}{7}(t-4)^{4/3}(t+3) + C$

21. Right: 260 gal

Midpoint: 240 gal