AB CALCULUS: WKS on U-Sub Day 1   **name** _____

Work the following on **notebook paper.** **No calculator.** (Not all problems will require u-sub.)

1. $\int x^2 \cos\left(x^3\right) dx$

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

3. $\int x\left(x^2+1\right)^3 dx$

4. $\int \dfrac{x}{\sqrt{9+x^2}}\, dx$

5. $\int \csc(5x)\cot(5x)\, dx$

6. $\int \left(8x^3 - 9x^2 + \dfrac{5}{x^2}\right) dx$

7. $\int \left((2x+3)(x-4)\right) dx$.

8. $\int \dfrac{x^2+2x-3}{x^4}\, dx$

9. $\int \sin^4(3x)\cos(3x)\, dx$

10. $\int_1^2 x\left(x^2+1\right)^3 dx$

11. $\int_0^{\pi/2} \sin^2 x \cos x\, dx$

12. $\int_1^4 \dfrac{e^{4/x}}{x^2}\, dx$

13. $\int_0^1 e^{-2x}\, dx$

14. $\int x 3^{x^2}\, dx$

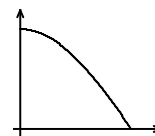15. $\int x^2 \sec^2\left(x^3\right) dx$

16. $\int_0^5 \sqrt{25-x^2}\, dx$

_____

Determine the area of the given region.

17. $y = x - x^2$ from $x = 0$ to $x = 1$
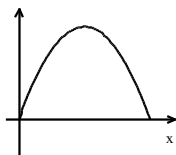
18. $y = \cos x$ from $x = 0$ to $x = \dfrac{\pi}{2}$

_____

Solve the differential equation.

19. $f'(x) = \cos x,\ f(0) = -5$

_____

20. Oil is leaking out of a tank. The rate of flow is measured every two hours for a 12-hour period, and the data is given in the table below.

Time (hr)	0	2	4	6	8	10	12
Rate (gal/hr)	30	27	25	21	16	13	7

(a) Estimate the number of gallons of oil that have leaked out of the tank during the 12-hour period by finding a **left** Riemann sum with **three** equal subintervals.

(b) Estimate the number of gallons of oil that have leaked out of the tank during the 12-hour period by finding a **right** Riemann sum with **three** equal subintervals.

(c) Estimate the number of gallons of oil that have leaked out of the tank during the 12-hour period by finding a **midpoint** Riemann sum with **three** equal subintervals.