

CALCULUS 2

Name: KELY

CHAPTERS 5 & 6 PRACTICE TEST

Evaluate the following indefinite integrals:

1. $\int 2x^{-3} + 6\sqrt{x} - 3x^{1/4} + \frac{2}{3}x^2 dx$

$$-x^{-2} + 4\sqrt{x^3} - \frac{12}{5}x^{5/4} + \frac{2}{9}x^3 + C$$

3. $\int 1 + \sin^2 x \csc x dx = \int 1 + \sin x$

$$x - \cos x + C$$

5. $\int \frac{2x}{\sqrt{4x^2 + 5}} dx \quad u = 4x^2 + 5 \quad du = 8x \quad \int \frac{1}{4} \cdot \frac{1}{\sqrt{u}} du$

$$\frac{1}{2}\sqrt{4x^2 + 5} + C$$

2. $\int \frac{x^5 + 2x^2 - 4}{2x^4} dx = \int \frac{1}{2}x + x^{-2} - 2x^{-4}$

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

4. $\int (2x+7)(x^2 + 7x + 3)^{4/5} dx \quad u = x^2 + 7x + 3 \quad du = 2x + 7 \quad \int u^{4/5} du$

$$\frac{5}{9}(x^2 + 7x + 3)^{9/5} + C$$

6. $\int \cos^3 2x \sin 2x dx \quad u = \cos 2x \quad du = -2\sin 2x \quad \int -\frac{1}{2}u^3 du$

$$-\frac{1}{8} \cos^4 2x + C$$

Evaluate the following definite integrals:

7. $\int_1^2 \frac{1}{x^3} - \frac{2}{x^2} + x^{-4} dx$

$$-\frac{1}{2}x^{-2} + 2x^{-1} - \frac{1}{3}x^{-3} \Big|_1^2$$

8. $\int_{-\pi/2}^{\pi/2} -3 \sin 2x dx$

$$\frac{3}{2} \cos 2x \Big|_{-\pi/2}^{\pi/2} = \frac{3}{2} - \frac{3}{2}$$

7. $-\frac{1}{3}$

8. 0

9. $\int_0^{\pi/4} \sec^2 x dx$

$$\tan x \Big|_0^{\pi/4}$$

10. $\int_{-1}^2 x \sqrt{5-x^2} dx$

$$\begin{aligned} u &= 5-x^2 \\ du &= -2x \\ \int_{-1}^1 -\frac{1}{2}u^{1/2} \end{aligned}$$

9. 1

10. $\frac{7}{2}$

11. $\int_{-1}^1 \frac{x^2}{(x^3 + 9)^2} dx$

$$\begin{aligned} u &= x^3 + 9 \\ du &= 3x^2 \end{aligned}$$

$$\int_8^{10} \frac{1}{3} \cdot \frac{1}{u^2}$$

12. $\int_0^{\pi/4} \frac{\sec^2 x}{(1+7\tan x)^{2/3}} dx$

$$\begin{aligned} u &= 1+7\tan x \\ du &= 7\sec^2 x dx \end{aligned}$$

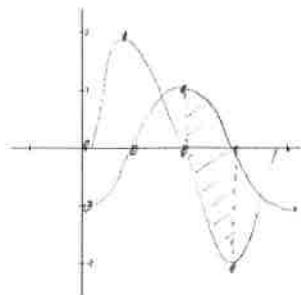
$$\int \frac{1}{7} \frac{1}{u^{2/3}}$$

11. $\frac{1}{120}$

12. $\frac{3}{7}$

13. Find the area between $y = 2 \sin x$ and

$$y = -\cos x \text{ on the interval } \left[\pi, \frac{3\pi}{2} \right].$$

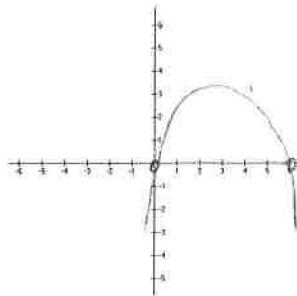


$$\int_{\pi}^{\frac{3\pi}{2}} -\cos x - 2\sin x \, dx$$

Answer: 3

15. Find the volume generated by the region

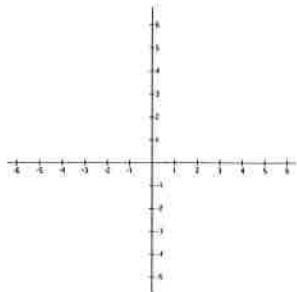
bounded by $y = -x^2 + 6x$ and $y = 0$
revolved about the x-axis.



$$\pi \int_0^6 (-x^2 + 6x)^2 \, dx$$

Answer: $\frac{1296\pi}{5}$

17. Find the volume generated by the region bounded by $y = -\frac{3}{4}x^3$, $y = 6$, and $x = 0$ revolved about the x-axis.

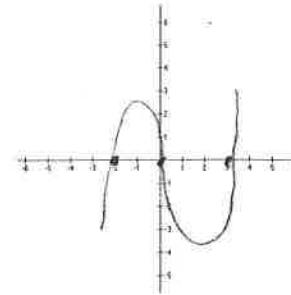


$$\pi \int_{-2}^0 6^2 - \left(-\frac{3}{4}x^3\right)^2 \, dx$$

Answer: $\frac{432\pi}{7}$

14. Find the area bounded by $y = x^3 - x^2 - 6x$

$$x(x^2 - x - 6) \\ (x-1)(x+2)$$



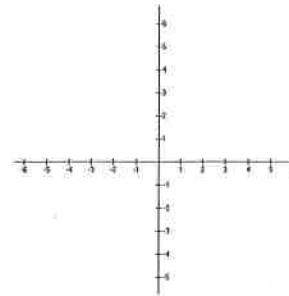
$$\int_{-2}^0 x^3 - x^2 - 6x \, dx = \frac{16}{3}$$

$$\int_0^3 x^3 - x^2 - 6x \, dx = -\frac{63}{4}$$

Answer: $\frac{253}{12}$

16. Find the volume generated by the region

bounded by $y = x^2 - 2$ and $y = 2$ revolved about $y = 2$.

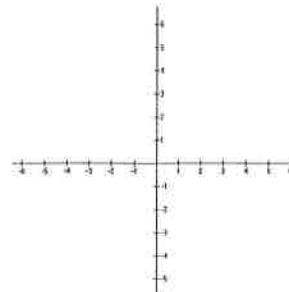


$$\pi \int_{-2}^2 (4-x^2)^2 \, dx$$

Answer: $\frac{512\pi}{15}$

18. Find the volume generated by the region

bounded by $y = -\sqrt{x}$, $x = 4$, and $y = 0$ revolved about $y = 3$.



$$\pi \int_0^4 (3+\sqrt{x})^2 - j^2 \, dx$$

Answer: 40π