1. Evaluate $\int_0^{\pi/2} \cos^4 x \, dx$

   (a) $\frac{\pi}{6}$

   (b) $\frac{2\pi}{9}$

   (c) $\frac{3\pi}{16}$

   (d) $\frac{\pi}{5}$

   (e) $\frac{5\pi}{8}$

2. To compute $\int \frac{x^2+1}{x^2-4x+4} \, dx$, the integrand should be reduced to

   (a) $\frac{A}{x-2} + \frac{B}{x-2}$

   (b) $x + \frac{A}{x-2} + \frac{B}{(x-2)^2}$

   (c) $\frac{A}{x-2} + \frac{B}{(x-2)^2}$

   (d) $1 + \frac{A}{x-2} + \frac{B}{(x-2)^2}$

   (e) $\frac{A}{x} + \frac{B}{x^2} + C$

3. To compute $\displaystyle\int_0^1 \frac{x^2}{\sqrt{x^2-2x+2}}\,dx$, the first step is to reduce the integral to:

   (a) $\displaystyle\int_0^{\pi/2} \sin^2\theta \tan\theta \, d\theta$

   (b) $\displaystyle\int_{-\pi/4}^{\pi/4} (1+\sin\theta)^2 \tan\theta \, d\theta$

   (c) $\displaystyle\int_{-\pi/4}^{0} (1+\tan\theta)^2 \sec\theta \, d\theta$

   (d) $\displaystyle\int_0^{\pi/4} \tan^2\theta \sec\theta \, d\theta$

   (e) $\displaystyle\int_0^{\pi/2} \sin^2\theta(1+\sec\theta) \, d\theta$

4. $\displaystyle\int_0^1 \frac{1}{\sqrt{x}}\,dx =$

   (a) 1

   (b) $\dfrac{2}{3}$

   (c) 2

   (d) $\dfrac{1}{2}$

   (e) Diverges

5. Compute $\displaystyle\int_0^{2\sqrt{2}} \frac{x^2}{\sqrt{16-x^2}}\,dx$

   (a) 2π

   (b) $2\pi - 2$

   (c) $2\pi + 2$

   (d) $2\pi - 4$

   (e) $2\pi + 4$

6. $\displaystyle\int \frac{2x^3+5x^2+8x+4}{(x^2+2x+2)^2}\,dx$

   (a) $\displaystyle\int \frac{2x+2}{x^2+2x+2}\,dx + \int \frac{2x+1}{(x^2+2x+2)^2}\,dx$

   (b) $\displaystyle\int \frac{2x+1}{x^2+2x+2}\,dx + \int \frac{2x+2}{(x^2+2x+2)^2}\,dx$

   (c) $\displaystyle\int \frac{2x}{x^2+2x+2}\,dx + \int \frac{2x+1}{(x^2+2x+2)^2}\,dx$

   (d) $\displaystyle\int \frac{2x}{x^2+2x+2}\,dx + \int \frac{2x+2}{(x^2+2x+2)^2}\,dx$

   (e) $\displaystyle\int \frac{2x+1}{x^2+2x+2}\,dx + \int \frac{2x}{(x^2+2x+2)^2}\,dx$

7. $\displaystyle\int \frac{x+13}{x^2+5x-6}\,dx =$

(a) $\ln\left|\dfrac{x-1}{(x+6)^2}\right| + C$

(b) $\ln\left|\dfrac{x+3}{x+2}\right| + C$

(c) $\ln\left|\dfrac{2(x-1)}{x+6}\right| + C$

(d) $\ln\left|\dfrac{(x-1)^2}{x+6}\right| + C$

(e) $\ln\left|\dfrac{x+2}{x+3}\right| + C$

8. $\displaystyle\int_0^1 (2x-1)e^{2x}\,dx$

(a) $\dfrac{1+e^2}{2}$

(b) $\dfrac{1-e^2}{2}$

(c) 1

(d) $\dfrac{1}{2}$

(e) e^2

9. What does the integral $\int \frac{1}{(4+x^2)^{3/2}}\,dx$ become after making the trigonometric substitution $x = 2\tan\theta$?

   (a) $\frac{1}{4}\int \sin\theta\,d\theta$

   (b) $\frac{1}{4}\int \tan\theta\,d\theta$

   (c) $\frac{1}{4}\int \cos\theta\,d\theta$

   (d) $\frac{1}{4}\int \sec^5\theta\,d\theta$

   (e) $\frac{1}{4}\int \frac{\tan\theta}{\sec^2\theta}\,d\theta$

10. Use the cylindrical shells method to find a formula for the volume of the solid of revolution obtained by revolving the region bounded by $y = x^2$ and $y = 1$ about the line $y = 3$.

    (a) $2\pi\int_{-1}^{1}(1-y)\sqrt{y}\,dy$

    (b) $2\pi\int_{0}^{1}(3-y)\sqrt{y}\,dy$

    (c) $4\pi\int_{0}^{1}(3-y)\sqrt{y}\,dy$

    (d) $2\pi\int_{0}^{1}(3-x)x^2\,dx$

    (e) $\pi\int_{-1}^{1}(1-x^2)\,dx$

11. Find the volume of the solid obtained by rotating the region bounded by the curves $y^2 = x - 1$ and $y = x - 1$ about the y-axis.

    (a) $\frac{3\pi}{7}$

    (b) $\frac{7\pi}{15}$

    (c) $\frac{\pi}{6}$

    (d) $\frac{\pi}{3}$

    (e) $\frac{\pi}{10}$

12. $\int e^{-x} \cos\left(\frac{x}{4}\right)\, dx =$

    (a) $\frac{1}{15} e^{-x} \left[4\cos\left(\frac{x}{4}\right) - 16\sin\left(\frac{x}{4}\right)\right] + C$

    (b) $\frac{1}{17} e^{-x} \left[4\sin\left(\frac{x}{4}\right) - 16\cos\left(\frac{x}{4}\right)\right] + C$

    (c) $\frac{1}{15} e^{-x} \left[4\sin\left(\frac{x}{4}\right) - 16\cos\left(\frac{x}{4}\right)\right] + C$

    (d) $\frac{1}{15} e^{-x} \left[16\sin\left(\frac{x}{4}\right) - 4\cos\left(\frac{x}{4}\right)\right] + C$

    (e) $\frac{1}{17} e^{-x} \left[16\sin\left(\frac{x}{4}\right) - 4\cos\left(\frac{x}{4}\right)\right] + C$

13. $\displaystyle\int x\tan^2 x\,dx =$

(a) $\sec^2 x - \tan x - \dfrac{x^2}{2} + C$

(b) $x\tan x + \ln|\cos x| - \dfrac{x^2}{2} + C$

(c) $x\sec^2 x + \ln|\cos x| - \dfrac{x^2}{2} + C$

(d) $x\sec^2 x + \tan x + C$

(e) $x\tan x + \ln|\sec x + \tan x| + C$

14. $\displaystyle\int_1^{+\infty} \frac{2+\cos^3(x^2+3x+4)}{\sqrt[7]{x}}\,dx$

(a) Converges by comparrison with $\displaystyle\int_1^{+\infty} \frac{2}{\sqrt[7]{x}}\,dx$

(b) Converges by comparrison with $\displaystyle\int_1^{+\infty} \frac{1}{\sqrt[7]{x}}\,dx$

(c) Converges by comparrison with $\displaystyle\int_1^{+\infty} \frac{3}{\sqrt[7]{x}}\,dx$

(d) Diverges by comparrison with $\displaystyle\int_1^{+\infty} \frac{1}{\sqrt[7]{x}}\,dx$

(e) Diverges by comparrison with $\displaystyle\int_1^{+\infty} \frac{3}{\sqrt[7]{x}}\,dx$

15. $\displaystyle\int_0^\infty \frac{1}{(2x+3)^3}\,dx =$

(a) $\dfrac{1}{36}$

(b) $\dfrac{1}{12}$

(c) $\dfrac{1}{18}$

(d) $\dfrac{1}{9}$

(e) $\dfrac{2}{9}$

16. **Find the volume of the solid obtained by rotating the region bounded by $y = x - x^2$ and $y = 0$ about the line $x = -1$.**

(a) $\dfrac{\pi}{2}$

(b) $\dfrac{\pi}{3}$

(c) 2π

(d) $-\dfrac{\pi}{2}$

(e) π