

1. a) $\frac{2x}{\sqrt{9+4x^2}}$ b) $\frac{1}{2}\sqrt{9+4x^2} + c$ 2. a) $\frac{3}{2}\ln|2x-1| + 2\ln(x^2+1) - 5\arctan x + c$

b) $-\frac{1}{4}\arccos^2(2x) \Big|_0^{1/4} = \frac{5\pi^2}{144}$ c) $\frac{1}{2}\left[x^4 \sin(x^2) + 2x^2 \cos(x^2) - 2\sin(x^2)\right] + c$

d) $-\frac{1}{5}\left[\ln|\cos(5x)| - \frac{\cos^2(5x)}{2}\right] + c$ e) $-\frac{1}{3}\left(\frac{\sqrt{1-x^2}}{x}\right)^3 + c$

3. a) $\lim_{x \rightarrow \infty} \frac{1}{2}\arctan\left(\frac{x-5}{2}\right) \Big|_5^x = \frac{\pi}{4}$ b) $\lim_{x \rightarrow 0^+} 2\sqrt{\tan x} \Big|_x^{\pi/4} = 2$

4. a) $-\frac{1}{3}$ b) e^{-2} c) $\frac{2}{5}$

5. $\frac{4}{3}\text{units}^2$ 6. a) $2\pi \int_0^{3/2} x(-x^2+3x-x^2)dx$ b) $\pi \int_0^{3/2} (1+3x-x^2)^2 - (1+x^2)^2 dx$

7. $2\ln\left(\frac{(2+\sqrt{2})\sqrt{3}}{3\sqrt{2}}\right)$ 8. $y = \frac{3}{2} - \frac{1}{2x^2}$ 9. *conv. to* $\frac{3\pi}{2}$

10. a) *conv. by comp.test or integral test* b) *conv. by ratio.test*
 c) *conv. by Root.test* d) *Div. by Divergence test*

11. a) *conv. by Alternating series test and div. by Limit Comparison test. So it is conditionally convergent.*

b) *Absolutely Conv. By Ratio test*

12. a) *conv. telescoping* $sum = -\frac{\pi}{6}$ b) *Geometric conv.* $sum = \frac{1}{3}$

13. a) *Conv.* b) *we can not say anything about this series as x=5 might be the other end point of interval of convergence* c) *Conv.* d) *Div.*

14. $R = \frac{1}{9}$ and the interval $\frac{17}{9} < x \leq \frac{19}{9}$

15. a) $-\frac{1}{3} + \frac{1}{9}(x-5) - \frac{2}{27}\frac{(x-5)^2}{2!} + \frac{6}{81}\frac{(x-5)^3}{3!} - \frac{24}{243}\frac{(x-5)^4}{4!}$

b) $-\frac{1}{3} + \sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x-5)^n}{3^{n+1}}$