

SHORT ANSWERS TO OLD FINAL EXAM

1. $y - \frac{4}{3} \arctan\left(\frac{y}{3}\right) + c$

2. $\frac{dp}{dt} = k(500 - p)$

3. $x \arcsin(3x) + \frac{1}{3} \sqrt{1 - 9x^2} + c$

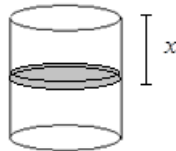
4. $16 \int \tan^2 \theta \sec^3 \theta d\theta$

5. $3 \ln|t| - \ln|t^2 + 1| + c$

6. a) $\sum_{i=1}^n \frac{H}{B} (B - x_i) \Delta x$

b) $\int_0^B kx \cdot \frac{H}{B} (B - x) dx$

7. $\int_3^{12} 62.4\pi(2)^2(x+5)dx$ one possibility



8. a) converges b) converges c) diverges

9. a) $f(x) = \frac{1}{(x-1)^{4/3}}$ has a vertical asymptote inside the interval at $x = 1$.

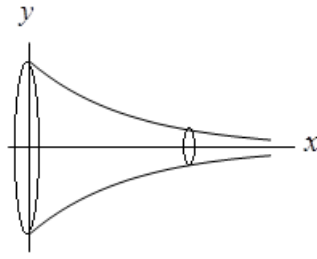
b) diverges

10. a) converges b) impossible to tell c) diverges

11. a) $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \frac{x^8}{4} + \dots$

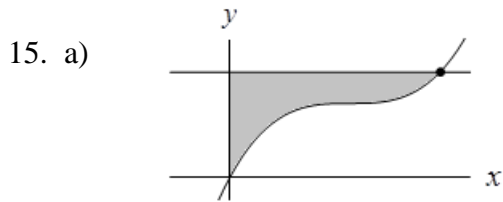
b) $-\frac{x^3}{3} - \frac{x^5}{10} - \frac{x^7}{21}$

$$12. \int_0^{\infty} \pi(e^{-2kx}) dx = \frac{\pi}{2k}$$



$$13. \int_0^8 \left(\left(\frac{16-y^2}{6} \right) - (-y) \right) dy$$

$$14. B = \sqrt{7}, B = -\sqrt{7}$$



b) $\int_0^{10} \pi(5-f(x))^2 dx$

16. Converges (use the Ratio Test).

17. a) The sequence converges to $\frac{3}{5}$. b) The series is geometric with $r = \frac{2}{5} < 1$.

c) The series converges to e^x .

$$18. z = e^{\sqrt{y^2+1}}$$

19. a) $P_2(x) = 3 - 2(x-1) + \frac{5}{2}(x-1)^2$

b) $f(1.1) \approx 2.825$

$$20. -\frac{3}{2}$$