Solution to Practice for Exam 2.

1.
$\int_0^1 ((3-x)-2x^2)(1+x)\,dx = \frac{11}{4}$

2.
$5\pi^5$

3.
A. Converges, bounded above by $\frac{\pi}{2}\int_1^\infty \frac{1}{x^3}\,dx = \frac{\pi}{4}$.

B. Converges, bounded above by $\int_1^\infty \frac{1}{y^2}\,dy = 1$.

C. Converges, bounded above by $\int_1^\infty \frac{2}{x^2}\,dx = 2$.

D. Converges, bounded above by $\int_0^1 \frac{1}{x^{-\frac{1}{3}}}\,dx = \frac{3}{4}$.

E. Diverges.

F. Diverges

4.
A. Converges to $\frac{1}{\ln 2}$

B. Diverges

C. Diverges

5.
$V = \pi\int_0^1((2-x)^2-(x^2)^2)\,dx = \frac{32\pi}{15}$

6.
A. $V = \pi\int_2^{\frac{1}{log(2)}}(10-2^x)^2\,dx$

B. $V = \pi\int_2^{\frac{1}{log(2)}}[(12)^2-(2^x+2)^2]\,dx$

$C.\ V = \pi \int_4^{10} \left(\frac{\log(y)}{\log(2)} - 2 \right)^2 dy$

7. $V = \pi \int_0^h (\frac{r\,x}{h})^2\, dx = \frac{\pi r^2 h}{3}$

9.

Exercise 8.7.6. cdf, $c = 1$, $P(x) = \begin{cases} 0 & \text{if } x < 0; \\ \frac{x}{5} & \text{if } 0 \le x \le 5; \\ 1 & \text{if } x \ge 5. \end{cases}$

$p(x) = \begin{cases} 0 & \text{if } x < 0; \\ \frac{1}{5} & \text{if } 0 \le x \le 5; \\ 0 & \text{if } x \ge 5. \end{cases}$

Exercise 8.7.9. pdf, $c = 2$, $p(x) = \begin{cases} 0 & \text{if } x < 0; \\ 4x & \text{if } 0 \le x \le 0.5; \\ 2 - 4(x - 0.5) = 4 - 4x & \text{if } 0.5 < x \le 1; \\ 0 & \text{if } x > 1 \end{cases}$

$P(x) = \begin{cases} 0 & \text{if } x < 0; \\ 2x^2 & \text{if } 0 \le x \le 0.5; \\ 4x - 2x^2 - 1 & \text{if } 0.5 < x \le 1; \\ 1 & \text{if } x > 1 \end{cases}$

10.

$A.\ c = -\frac{1}{6} \ln 0.9 \approx 0.0176$

$B.\ 9\%$

11.

$A.\ s_n = \frac{(-1)^{n-1}}{2n+1},\ n \ge 1$

$B.\ s_n = \frac{13}{4n+1},\ n \ge 1$

12.

$A.\ S = \frac{4}{1 - -\frac{1}{2}} = \frac{8}{3}$

$B.$ Sum does not exists

13.

$A.\ \frac{\frac{2}{9}[1 - (\frac{1}{3})^7]}{1 - \frac{1}{3}} = \frac{3^7 - 1}{3^8}$

$B.\ S = \frac{\frac{2}{3}}{1-\frac{1}{3}} = 1$

14. $(a)\ \pi \int_0^5 (\frac{2y}{5})^2\, dy\, cm^3 = \frac{20}{3}\pi\ cm^3$

$(b)\ \int_0^7 (20\sqrt{7^2 - y^2})\, dy\, m^3 = 245\ m^3$

$(c)\ \pi \int_0^5 (5^2 - y^2)\, dy\, mm^3 = \frac{250}{3}\pi mm^3$

$(d)\ \int_0^2 (2 - y)^2\, dy\, m^3 = \frac{8}{3}m^3$