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 $\frac{\pi}{2}\int_1^\infty \frac{1}{x^3}\,dx = \frac{\pi}{4}$.: Upper bound: $\frac{\pi}{4}$

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

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

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

E. Diverges.

F. Diverges

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

B. Converges to $\frac{\sqrt{2}\pi}{4}$

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

8. $Total flow = \int_0^R [2\pi r k(R^2 - r^2)]\, dr = \frac{\pi k R^4}{2}$, where k is the proportional constant.

9.
$A.\ 62.4\pi \int_0^1 (\frac{1}{2}h)^2(6-h)\, dh = \frac{7\pi \cdot 62.4}{16}$ ft-Ib

$B.\ 62.4\pi \int_3^4 (\frac{1}{2}(4-h))^2(h+2)\, dh = \frac{7\pi \cdot 62.4}{16}$ ft-Ib

$C.\ 62.4\pi \int_5^6 (\frac{1}{2}(6-h))^2 h\, dh = \frac{7\pi \cdot 62.4}{16}$ ft-Ib

$D.\ 62.4\pi \int_0^1 (\frac{1}{2}(1-h))^2(h+5)\, dh = \frac{7\pi \cdot 62.4}{16}$ ft-Ib

10.
$W = \int_0^{10} (2^2\pi \cdot\ 62.4\,)(11-h)\, dh = 14970\pi$ ft-Ib

11.
$A.\ s_n = \frac{(-1)^{n-1}}{2n+1},\ n \geq 1$

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

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. $W = \int_0^{20} (500 + 2(30 - h))\, dh = 10800$ ft-Ib

15. (a) $\pi \displaystyle\int_0^5 (\tfrac{2h}{5})^2\, dy\, cm^3 = \frac{20}{3}\pi\ cm^3$

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

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

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