APBC S.Hogan
Unit 3 Review

The topics on this review are similar to those found on the unit exam. Keep in mind that although the concepts will be the same, you may be required to apply them differently. In addition to this review, you should make sure that you are familiar with all material and formulae from this chapter.

Exam Format:

(1) 25 multiple-choice questions
(2) NO CALCULATORS
(3) You will NOT be penalized for wrong answers on the multiple-choice, so you should answer EVERY question.

Time Restrictions:

You will have 48 minutes to complete this examination. This means that you are being required to move FASTER than AP pace (2 minutes per non-calculator multiple-choice.)

PLEASE COMPLETE THIS REVIEW SHEET IN ITS ENTIRETY BEFORE WE DO OUR IN-CLASS REVIEW. THAT IS THE BEST WAY TO PREPARE FOR THIS EXAM.

1	If three equal subdivisions of $[-4, 2]$ are used, what is the trapezoidal approximation of $\int_{-4}^{2} \frac{e^{-x}}{2}\,dx$? (A) $e^2+e^0+e^{-2}$ (B) $e^4+e^2+e^0$ (C) $e^4+2e^2+2e^0+e^{-2}$ (D) $\frac{1}{2}\left(e^4+e^2+e^0+e^{-2}\right)$ (E) $\frac{1}{2}\left(e^4+2e^2+2e^0+e^{-2}\right)$
2	$\int x\cos x\,dx =$ (A) $x\sin x-\cos x+C$ (B) $x\sin x+\cos x+C$ (C) $-x\sin x+\cos x+C$ (D) $x\sin x+C$ (E) $\frac{1}{2}x^2\sin x+C$
3	$\int_1^e\left(\frac{x^2-1}{x}\right)dx =$ (A) $e-\frac{1}{e}$ (B) e^2-e (C) $\frac{e^2}{2}-e+\frac{1}{2}$ (D) e^2-2 (E) $\frac{e^2}{2}-\frac{3}{2}$

4

$\int_0^3 (x+1)^{1/2}\, dx =$

(A) $\frac{21}{2}$ (B) 7 (C) $\frac{16}{3}$ (D) $\frac{14}{3}$ (E) $-\frac{1}{4}$

5

Which of the following is equal to $\int \frac{1}{\sqrt{25-x^2}}\, dx$?

(A) $\arcsin \frac{x}{5} + C$ (B) $\arcsin x + C$ (C) $\frac{1}{5}\arcsin \frac{x}{5} + C$

(D) $\sqrt{25-x^2} + C$ (E) $2\sqrt{25-x^2} + C$

6

$\int_0^{\pi/4} \tan^2 x\, dx =$

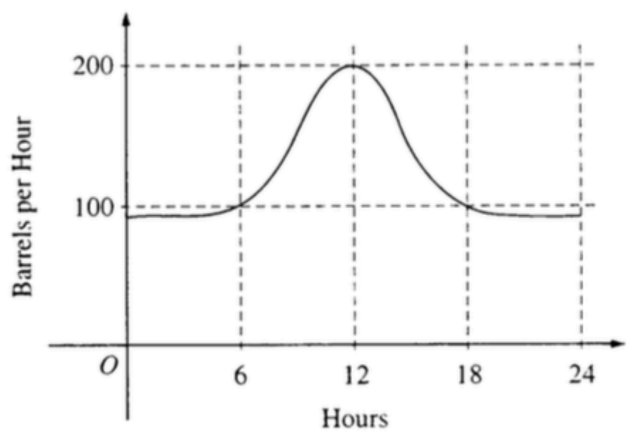
(A) $\frac{\pi}{4} - 1$ (B) $1 - \frac{\pi}{4}$ (C) $\frac{1}{3}$ (D) $\sqrt{2} - 1$ (E) $\frac{\pi}{4} + 1$

7

$\int_4^{\infty} \frac{-2x}{\sqrt[3]{9-x^2}}\, dx$ is

(A) $7^{\frac{2}{3}}$ (B) $\frac{3}{2}\left(7^{\frac{2}{3}}\right)$ (C) $9^{\frac{2}{3}} + 7^{\frac{2}{3}}$ (D) $\frac{3}{2}\left(9^{\frac{2}{3}} + 7^{\frac{2}{3}}\right)$ (E) nonexistent

8



The flow of oil, in barrels per hour, through a pipeline on July 9 is given by the graph shown above. Of the following, which best approximates the total number of barrels of oil that passed through the pipeline that day?

(A) 500 (B) 600 (C) 2,400 (D) 3,000 (E) 4,800

9	If $\int f(x)\sin x\,dx = -f(x)\cos x + \int 3x^2\cos x\,dx$, then $f(x)$ could be (A) $3x^2$ (B) x^3 (C) $-x^3$ (D) $\sin x$ (E) $\cos x$
10	$\int_0^8 \frac{dx}{\sqrt{1+x}} =$ (A) 1 (B) $\frac{3}{2}$ (C) 2 (D) 4 (E) 6
11	If f is a function such that $f'(x)$ exists for all x and $f(x) > 0$ for all x, which of the following is NOT necessarily true? (A) $\int_{-1}^{1} f(x)\,dx > 0$ (B) $\int_{-1}^{1} 2f(x)\,dx = 2\int_{-1}^{1} f(x)\,dx$ (C) $\int_{-1}^{1} f(x)\,dx = 2\int_{0}^{1} f(x)\,dx$ (D) $\int_{-1}^{1} f(x)\,dx = -\int_{1}^{-1} f(x)\,dx$ (E) $\int_{-1}^{1} f(x)\,dx = \int_{-1}^{0} f(x)\,dx + \int_{0}^{1} f(x)\,dx$
12	$\int_2^{+\infty} \frac{dx}{x^2}$ is (A) $\frac{1}{2}$ (B) $\ln 2$ (C) 1 (D) 2 (E) nonexistent
13	$\int \frac{dx}{(x-1)(x+2)} =$ (A) $\frac{1}{3}\ln\left\|\frac{x-1}{x+2}\right\| + C$ (B) $\frac{1}{3}\ln\left\|\frac{x+2}{x-1}\right\| + C$ (C) $\frac{1}{3}\ln\|(x-1)(x+2)\| + C$ (D) $(\ln\|x-1\|)(\ln\|x+2\|) + C$ (E) $\ln\left\|(x-1)(x+2)^2\right\| + C$
14	If $\int_1^2 f(x-c)\,dx = 5$ where c is a constant, then $\int_{1-c}^{2-c} f(x)\,dx =$ (A) $5+c$ (B) 5 (C) $5-c$ (D) $c-5$ (E) -5

15	$\int_0^1 (x+1)e^{x^2+2x}\,dx =$ (A) $\frac{e^3}{2}$ (B) $\frac{e^3-1}{2}$ (C) $\frac{e^4-e}{2}$ (D) e^3-1 (E) e^4-e
16	$\int_0^1 \sqrt{x^2-2x+1}\,dx$ is (A) -1 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) 1 (E) none of the above
17	$\int_{-1}^{2} \frac{\lvert x\rvert}{x}\,dx$ is (A) -3 (B) 1 (C) 2 (D) 3 (E) nonexistent
18	$\int \arcsin x\,dx =$ (A) $\sin x - \int \frac{x\,dx}{\sqrt{1-x^2}}$ (B) $\frac{(\arcsin x)^2}{2} + C$ (C) $\arcsin x + \int \frac{dx}{\sqrt{1-x^2}}$ (D) $x \arccos x - \int \frac{x\,dx}{\sqrt{1-x^2}}$ (E) $x \arcsin x - \int \frac{x\,dx}{\sqrt{1-x^2}}$
19	Given $f(x) = \begin{cases} x+1 & \text{for } x<0, \\ \cos \pi x & \text{for } x \ge 0, \end{cases}$ $\int_{-1}^{1} f(x)\,dx =$ (A) $\frac{1}{2}+\frac{1}{\pi}$ (B) $-\frac{1}{2}$ (C) $\frac{1}{2}-\frac{1}{\pi}$ (D) $\frac{1}{2}$ (E) $-\frac{1}{2}+\pi$

20	If the substitution $u = \frac{x}{2}$ is made, the integral $\int_2^4 \frac{1-\left(\frac{x}{2}\right)^2}{x} dx =$ (A) $\int_1^2 \frac{1-u^2}{u} du$ (B) $\int_2^4 \frac{1-u^2}{u} du$ (C) $\int_1^2 \frac{1-u^2}{2u} du$ (D) $\int_1^2 \frac{1-u^2}{4u} du$ (E) $\int_2^4 \frac{1-u^2}{2u} du$
21	$\int_0^1 \frac{x+1}{x^2+2x-3} dx$ is (A) $-\ln\sqrt{3}$ (B) $-\frac{\ln\sqrt{3}}{2}$ (C) $\frac{1-\ln\sqrt{3}}{2}$ (D) $\ln\sqrt{3}$ (E) divergent
22	$\int \sin(2x+3)dx =$ (A) $-2\cos(2x+3)+C$ (B) $-\cos(2x+3)+C$ (C) $-\frac{1}{2}\cos(2x+3)+C$ (D) $\frac{1}{2}\cos(2x+3)+C$ (E) $\cos(2x+3)+C$
23	If f is continuous on the interval $[a,b]$, then there exists c such that $a<c<b$ and $\int_a^b f(x)dx =$ (A) $\frac{f(c)}{b-a}$ (B) $\frac{f(b)-f(a)}{b-a}$ (C) $f(b)-f(a)$ (D) $f'(c)(b-a)$ (E) $f(c)(b-a)$
24	If $\int_1^4 f(x)dx = 6$, what is the value of $\int_1^4 f(5-x)dx$? (A) 6 (B) 3 (C) 0 (D) -1 (E) -6
25	If $F(x) = \int_1^{x^2} \sqrt{1+t^3}\, dt$, then $F'(x) =$ (A) $2x\sqrt{1+x^6}$ (B) $2x\sqrt{1+x^3}$ (C) $\sqrt{1+x^6}$ (D) $\sqrt{1+x^3}$ (E) $\int_1^{x^2} \frac{3t^2}{2\sqrt{1+t^3}} dt$