AP Calculus AB 4-2, 4-6 Morning Review **Name**______________________________

Calculators permitted.

1. Find the sum: $\sum_{i=1}^{3}\left[(2i+1)^2-(3i+1)^3\right]$

2. Use Sigma notation to write the sum: $\frac{7\sqrt{3}}{27}+\frac{7\sqrt{4}}{64}+\frac{7\sqrt{5}}{125}+\frac{7\sqrt{6}}{216}+\ldots\frac{7\sqrt{n}}{n^3}$

3. Use 4 middle rectangles to approximate the area of the region bounded by $f(x) = 3 + 2x^2$, the x-axis, $x = 1$, and $x = 7$.

4. Use the table of values on the right to estimate the below:

x	1	5	6	8	11	13	15
f(x)	4	2	7	3	1	6	5

a. Use 3 middle rectangles with intervals indicated by the table to estimate the area between the curve and x-axis on [1, 15]

b. Use 3 right-handed rectangles with intervals indicated by the table to estimate area between the curve and x-axis on [5, 11]

c. Use 4 trapezoids with interval indicated by the table to estimate area between the curve and x-axis on [6, 15]

5. Given the region bounded by $g(x) = 3 - 2x^2$, the x-axis, $x = -1$, and $x = 1$. Use the **limit definition** to find the exact area of the region.

AP Calculus AB 4-2, 4-6 Morning Review **Name** Key

Calculators permitted.

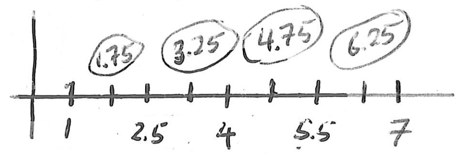
1. Find the sum: $\sum_{i=1}^{3}\left[(2i+1)^2-(3i+1)^3\right] = (2+1)^2-(3+1)^3+(4+1)^2-(6+1)^3+(6+1)^2-(9+1)^3$
$= 3^2-4^3+5^2-7^3+7^2-10^3 = \boxed{-1324}$

2. Use Sigma notation to write the sum: $\frac{7\sqrt{3}}{27}+\frac{7\sqrt{4}}{64}+\frac{7\sqrt{5}}{125}+\frac{7\sqrt{6}}{216}+\ldots\frac{7\sqrt{n}}{n^3}$

$\boxed{\sum_{i=3}^{n}\frac{7\sqrt{i}}{i^3}}$

3. Use 4 middle rectangles to approximate the area of the region bounded by $f(x) = 3+2x^2$, the x-axis, $x = 1$, and $x = 7$.

$w = \frac{b-a}{n} = \frac{7-1}{4} = \frac{3}{2}$



$A \approx (1.5)f(1.75) + 1.5\cdot f(3.25) + 1.5\cdot f(4.75) + 1.5\cdot f(6.25)$
$\approx 1.5(9.125+24.125+48.125+81.125)$
$\approx (1.5)(162.5)$
$\approx \boxed{243.75}$

4. Use the table of values on the right to estimate the below:

x	1	5	6	8	11	13	15
f(x)	4	2	7	3	1	6	5

a. Use 3 middle rectangles with intervals indicated by the table to estimate the area between the curve and x-axis on [1, 15]

$5\cdot f(5)+5f(8)+4f(13)$
$5(2)+5(3)+4(6)$
$\boxed{49}$

b. Use 3 right-handed rectangles with intervals indicated by the table to estimate area between the curve and x-axis on [5, 11]

$1f(6)+2f(8)+3f(11)$
$1(7)+2(3)+3(1)$
$\boxed{16}$

c. Use 4 trapezoids with interval indicated by the table to estimate area between the curve and x-axis on [6, 15]

$A = \frac{W}{2}(h_1+h_2)$

$= \frac{2}{2}[f(6)+f(8)]+\frac{3}{2}[f(8)+f(11)]+\frac{2}{2}[f(11)+f(13)]+\frac{2}{2}[f(13)+f(15)]$
$= \frac{2}{2}(10)+\frac{3}{2}(4)+\frac{2}{2}(7)+\frac{2}{2}(11)$
$\boxed{34}$

5. Given the region bounded by g (x) = $3 - 2x^2$, the x-axis, x = -1, and x = 1. Use the **limit definition** to find the exact area of the region.

$W = \frac{1--1}{n} = \frac{2}{n}$

$A = \lim_{n\to\infty}\sum_{i=1}^{n} \text{width}\cdot f[a+\text{width}\cdot i]$

$= \frac{2}{n}\cdot f\left[-1+\frac{2}{n}i\right]$

$= \frac{2}{n}\cdot\left[3-2\left(-1+\frac{2}{n}i\right)^2\right]$

$= \frac{2}{n}\left[3-2\left(1-\frac{4}{n}i+\frac{4}{n^2}i^2\right)\right]$

$= \frac{2}{n}\left[3-2+\frac{8}{n}i-\frac{8}{n^2}i^2\right]$

$\sum \frac{2}{n}+\frac{16}{n^2}i-\frac{16}{n^3}i^2$

$\lim_{n\to\infty} \frac{2}{n}\boxed{\sum_{i=1}^{n}1}+\frac{16}{n^2}\boxed{\sum_{i=1}^{n}i}-\frac{16}{n^3}\boxed{\sum_{i=1}^{n}i^2}$

$\lim_{n\to\infty} \frac{2}{n}(n)+\frac{16}{n^2}\left[\frac{n(n+1)}{2}\right]-\frac{16}{n^3}\left[\frac{n(n+1)(2n+1)}{6}\right]$

$\lim_{n\to\infty} 2+\frac{16n^2}{2n^2}-\frac{16(2n^3)}{6n^3}$

$= 2+8-\frac{32}{6}$

$= \boxed{\frac{14}{3}}$