AP Calculus AB 4-1, 4-2, 4-6 Morning Review WS #3

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: $\frac{7\sqrt{3}}{27}+\frac{7\sqrt{4}}{64}+\frac{7\sqrt{5}}{125}+\frac{7\sqrt{6}}{216}$

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.

Find the general antiderivative of $g(x)$. (Find $\int g(x)dx$)

6. $g(x) = x(2x-1)^2$

7. $g(x) = \frac{4}{\sqrt[3]{x}} - \sqrt{x} + 3x^2 - \frac{1}{3x^4}$

8. $g(x) = \frac{x^3 - 2\sqrt{x} + \sqrt[4]{x}}{\sqrt{x}}$

9. Find the **general** expression of $f(x)$ if $f''(x) = 2x^3 + 3x^2 + x - 1$

10. Find the **specific** expression of $f(x)$ if $f''(x) = 12x^2 + 18x - 4$, $f'(-1) = 9$, and $f(1) = 3$

4.1, 4.2, 4.6 Formula Sheet:

Summation Formulas:

1) $\sum_{i=1}^{n} 1 = n$

2) $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$

3) $\sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6}$

4) $\sum_{i=1}^{n} i^3 = \frac{n^2(n+1)^2}{4}$

5) $\sum_{i=1}^{n} c\boldsymbol{a_i} = c\sum_{i=1}^{n} \boldsymbol{a_i}$

Area using Limit Definition

$$\lim_{n\to\infty} \sum_{i=1}^{n} (width) * f(left\ endpoint + width * i)$$

width = $\frac{b-a}{n}$

Trapezoid Area:

$Area = \frac{1}{2}w(h_1 + h_2)$

Integral Formulas:

Power Rule:

$$\int u^n du = \frac{u^{n+1}}{n+1} + C$$

Trig Integrals:

$\int sin\, u\, du = -cos\, u + C$

$\int cos\, u\, du = sin\, u + C$

$\int sec^2\, u\, du = tan\, u + C$

$\int sec\, u\, tan\, u\, du = sec\, u + C$

$\int csc^2\, u\, du = -cot\, u + C$

$\int csc\, u\, cot\, u\, du = -csc\, u + C$