Answers to Calculus Discovery Sheets

Sheet#4 – 1)a) 30 $^m/_s$ b) 27 $^m/_s$ c) 25.5 $^m/_s$
         d) 24.3 $^m/_s$ e) 24.03 $^m/_s$ f) 24.0003 $^m/_s$
    2)   24 $^m/_s$ 3)   42 $^m/_s$

Sheet#5 – 1)a) 39 $^m/_s$ 2) r = 30 + 3h
    3) r = 6t + 3h   4) v(t) = 6t   5) v(t) = 2 k t

Sheet#6 – 2)a) r = 51 $^m/_s$ b) v = 18 $^m/_s$
    c) v = 17.6 $^m/_s$ d) v = 58.8 $^m/_s$

Sheet#7 – 2)a) $7x^6$ b) $12x^2$ c) $5x^4 + 28x^3 - 6x^2 + 2x - 3$
          3) $f'(x) = k \cdot n \cdot x^{n-1}$

Sheet#8 – 1) $\frac{4}{7}$ 2) $5 \cdot \frac{4}{7} \rightarrow \frac{20}{7}$ 3) $k \cdot \frac{4}{7} \rightarrow \frac{4k}{7}$

    4) $\frac{k^2 4^2}{7^2}$ 5) $\frac{k^2 4^3}{7^3}$

    6) $1^2 \left(\frac{4}{7}\right)^3 + 2^2 \left(\frac{4}{7}\right)^3 + 3^2 \left(\frac{4}{7}\right)^3 + ... + 7^2 \left(\frac{4}{7}\right)^3$

       $= \frac{4^3}{7^3} \left(1^2 + 2^2 + 3^2 + ... + 7^2\right) = \sum_{i=1}^{7} i^2$

    Now we use the summation formula:

    $\sum_{i=1}^{n} i^2 = \frac{1}{3} n^3 + \frac{1}{2} n^2 + \frac{1}{6} n$, which gives us:

    $\frac{4^3}{7^3} \left(\frac{1}{3} 7^3 + \frac{1}{2} 7^2 + \frac{1}{6} 7\right) \rightarrow \frac{4^3}{3} + \frac{4^3}{2 \cdot 7} + \frac{4^3}{6 \cdot 7^2}$

    ≈ 26.12

7) Following the same process, we get:
    $\frac{a^3}{n^3} \left(\frac{1}{3} n^3 + \frac{1}{2} n^2 + \frac{1}{6} n\right) \rightarrow \frac{a^3}{3} + \frac{a^3}{2 \cdot n} + \frac{a^3}{6 \cdot n^2}$

8) a) ≈ 21.40
    b) as n approaches infinity, the second two
        factional terms approach zero. Therefore
        the answer is $\frac{a^3}{3}$.

Sheet#9 – 1) a) $\frac{5a^3}{3}$ b) $\int_0^a f(x)\, dx = \frac{a^{n+1}}{n+1}$

    2)a) $\frac{a^5}{5}$ b) $\frac{x^5}{5} + C$

    3)a) $48x^5$ b) $\frac{8a^7}{7}$ c) $\frac{8x^7}{7} + C$ d) $8x^6$