(1) Evaluate the sum
$$\sum_{i=1}^{100}(2-3i+5i^2).$$

(2) Evaluate the sum
$$\sum_{i=1}^{1000}(i-1)^5-i^5.$$

(3) Evaluate the sum
$$\sum_{i=1}^{1000} i^2-(i+2)^2$$

(4) Evaluate
$$\lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{n}\left(8-\left(\frac{2i}{n}\right)^3\right)$$

(5) Evaluate
$$\lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{n}\left(1-\left(\frac{i}{n}\right)^2\right)$$

(6) Write
$$1-1/2+1/3-1/4+1/5-1/6+1/7-1/8+1/9-1/10$$
as a sum.

(7) Write
$$1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}+\frac{1}{64}+\frac{1}{128}+\frac{1}{256}+\frac{1}{512}$$
using summation notation.

(8) Let $f''(x)=\cos(x)$, with $f'(\pi/2)=0$ and $f(0)=3$. Find $f(x)$.

(9) A particle is moving with acceleration $a(t)=2t+1$. Its position at time $t=0$ is 3, and its velocity at time $t=0$ is -2. Find the position function for the particle.

(10) Find the antiderivative F of f that satisfies the given condition:
$$f(x)=4-3(1+x^2)^{-1}, \qquad F(1)=0.$$

(11) Find the most general antiderivative of the function $f(x)=\sqrt[3]{x^2}+x\sqrt{x}$.

(12) Find the most general antiderivative of the function
$$f(x)=x(2+\sqrt{x}).$$

(13) A car is travelling at 50 miles per hour when the brakes are fully applied, producing a constant deceleration of 22 feet per second squared. What is the distance travelled before the car comes to a stop. (Calculator needed!)

(14) Using Newton's method for the function $f(x)=x^3+x+1$ and an initial approximation of $x_1=0$, find the second approximation x_2.

(15) Use a linear approximation to estimate the value of $f(x)=x^3+x+1$ at $x=2.01$.

(16) Find the intervals where

$$f(x) = \frac{x^2}{\sqrt{x+1}}$$

is increasing and decreasing.

(17) On what intervals is

$$y = \frac{2x^2}{x^2 - 1}$$

concave up and concave down.

(18) Evaluate

$$\lim_{x \to 0} \frac{e^{2x} - 1}{\sin x}.$$

(19) Evaluate

$$\lim_{x \to 1^+} [\ln(x^7 - 1) - \ln(x^5 - 1)].$$

(20) Find all asymptotes of the function

$$f(x) = \frac{1 + 5x - 2x^2}{x - 2}.$$

Answers

(1) 1676800
(2) -10^{15}
(3) -2006000
(4) 6
(5) 2/3
(6) $\displaystyle\sum_{i=1}^{10} \frac{(-1)^{i+1}}{i}$
(7) $\displaystyle\sum_{i=0}^{9} 2^{-i}$
(8) $-\cos x - x + 4$
(9) $t^3/3 + t^2/2 - 2t + 3$
(10) $4x - \arctan x + \frac{3\pi}{4} - 4$
(11) $\frac{3}{5}x^{5/3} + \frac{2}{5}x^{5/2} + C$
(12) $x^2 + \frac{2}{5}x^{5/2} + C$
(13) 122.22 feet
(14) -1
(15) 11.13
(16) increasing on $(0, \infty)$; decreasing on $(-1, 0)$.
(17) Concave up on $(-\infty, -1) \cup (1, \infty)$; Concave down on $(-1, 1)$.
(18) 2
(19) $\ln(7/5)$
(20) $x = 2$ and $y = -2x + 1$