1. A = $\lim\limits_{x \to -3} \dfrac{x^3 + 2x^2 - 5x - 6}{x + 3}$

B = $\lim\limits_{x \to 7} \dfrac{2x - 14}{\sqrt{x+9} - \sqrt{2x+2}}$

C = $\lim\limits_{x \to \infty} \left(1 + \dfrac{2}{x}\right)^x$

D = $\lim\limits_{x \to 0} \dfrac{2\sin x \cdot \cos x - 2x^2 - 2x}{x^2}$

Find A + B + C + D.

2. A = $f'\left(\dfrac{\pi}{6}\right)$ if $f(x) = \sin^2 \ 2x$

B = $g'\left(\dfrac{1}{2}\right)$ if $g(x) = x \cdot \arcsin x$

C = $h' \ 1$ if $h(x) = e^{\ln\sqrt{4-x^2}}$

D = $h' \ g \ 2$ if $h(x) = x^{\ln x}$ and $g(x) = e$

Find $A \cdot C \cdot D + B$.

3. A = $\displaystyle\int_0^{1/2} \frac{1}{1-x}\,dx$

B = $\displaystyle\int_0^{\infty} \frac{1}{4+x^2}\,dx$

C = $\displaystyle\int_0^{1} \frac{x}{1+x^2}\,dx$

D = $\displaystyle\int_0^{1} \frac{x^2}{1+x^2}\,dx$

Find A + B + C + D.

4. E = $e'(2)$, where $e(x) = x^4 - 2x^3 - 3x^2 + 4x$.

R = $r'(1)$, where $r(x) = x^7 + x^6 + x^5 + x^4 + x^3 + x^2 - 26x$.

T = $t'(-1)$, where $t(x) = x^7 + x^6 + x^5 + x^4 + x^3 + x^2 - x$.

Let $B = \displaystyle\int_E^R T \cdot z \, dz$. Find $B$.

5. Suppose $xy^2 - x^3 y = 12$, let

A = the slope of the tangent line at the point with x-coordinate 1 and positive y-coordinate
B = the x-coordinate of the point where the tangent line is vertical
C = the x-coordinate of the point where the tangent line is horizontal
D = the slope of the tangent line at the point with x-coordinate 1 and negative y-coordinate

Find A, B, C, and D.

6. The point $\left(1,\frac{1}{2}\right)$ is on the graph of $y=f(x)$, and the slope at each point $x, y$ on the graph of *f* is given by $\frac{dy}{dx}=\frac{y^2}{x}$.

A = the value of $\frac{d^2y}{dx^2}$ at the point $\left(1,\frac{1}{2}\right)$

B = *k*, if $k>0$ and x = *k* is a vertical asymptote of the graph of $y=f(x)$

C = *p*, if y = *p* is a horizontal asymptote of the graph of $y=f(x)$

D = $f(e)$

Find A + B – C – D.

7. A = the area of the region bound by $y=x^2-x+3$ and $y=-x^2+3x+9$

B = the volume obtained by rotating the region bounded by $y=x^8$ and $y=\sqrt[18]{x}$ about the $x$-axis

C = the maximum value of $f(x)=x^3+8x^2-12x+4$ on the interval $[-10,5]$

D = the rate at which an equilateral triangle's area is changing in square inches per second if its side length is increasing at $2\sqrt{3}$ inches per second, at the moment when its side length is 4 inches

Find A + B + C + D.

8. Suppose $f(x)=\frac{1}{2}x^2, g(x)=\frac{x}{2}, and\ h(x)=-\frac{3}{2}x+2$, let

A = the are of the region bounded on the left by x =0 and on the right by the graphs of *g* and *h*

B = the area of the region bounded above by functions *f* and *h* and bounded below by the x-axis

C = the area between the graphs of functions *f* and *g*

D = the area between the graphs of *f* and *h* that lies to the left of the y-axis

Find $\frac{A\cdot C}{B\cdot D}$.

9. Suppose $f(x)=\frac{1}{2}x^2$ on [0, 4], let

A = the left Riemann sum approximation of $\int_0^4 f(x)\,dx$ with 4 equal subintervals

B = the right Riemann sum approximation of $\int_0^4 f(x)\,dx$ with 2 equal subintervals

C = the midpoint Riemann sum approximation of $\int_0^4 f(x)\,dx$ with 4 equal subintervals

D = the trapezoidal approximation of $\int_0^4 f(x)\,dx$ with 4 equal subintervals

Find A + B + C + D.

10. A television camera at ground level is filming the lift-off of a space shuttle that is rising vertically according to the position function $s(t)=\frac{1}{2}t^2$ miles where *t* is measured in minutes. The camera is $\frac{1}{2}$ mile from the point of lift-off of the shuttle.
A = the rate of change, in radians per minute, of the angle of elevation of the camera 1 minute after lift-off as it follows the path of the shuttle
B = the velocity, in miles per hour, of the space shuttle 5 minutes after lift-off
C = the rate of change, in miles per minute, of the distance between the camera and the shuttle 1 minute after lift-off
D = the rate of change, in radians per minute, of the angle of elevation of the camera when the velocity of the shuttle reaches 2 miles/min
Find A, B, C, and D.

11. Region $R_1$ is bounded by $y=e^x, x=0, y=0, and\ x=\ln 2$.

Region $R_2$ is bounded by $y=e^x, x=0, y=2$.

A = the volume of the solid formed if $R_1$ is revolved about the line y = 0

B = the volume of a solid such that $R_1$ is the base and all cross sections perpendicular to the x-axis are squares

C = $a\cdot b$ if the volume of the solid formed when $R_2$ is revolved about the line y = 0 is expressed in the form $\pi \ \ln a-b$

D = $a\cdot b$ if the volume of a solid is $\ln a-b$. The base of the solid is $R_2$ and all cross sections perpendicular to the x-axis are squares

Find $\frac{A}{\pi}-B+C+D$.

12. The position function, $s(t)=\frac{1}{2}t^3-6t^2+18t-1$, describes the position of an object as it moves on a number line for $0\le t\le 3$.

A = the velocity of the object at t =1

B = the maximum distance from the origin that is reached by the object

C = the total distance traveled by the object

D = the acceleration of the object at the instant that it stops

Find $4A\cdot C+B+D$.

13. A = $\lim\limits_{x\to\frac{\pi}{2}^-}\frac{2\tan x}{1+\sec x}$

B = $\lim\limits_{x\to 0} 1+3x^{\frac{1}{2x}}$

C = $\lim\limits_{x\to 0}\left(\frac{1}{e^x-1}-\frac{1}{x}\right)$

D = $\lim\limits_{x\to 0^+} e^x-1^{x}$

Find A + B + C + D.

14. Let $x(t)=2t^2-5$ and $y(t)=2t+3$ describe the motion of a point moving in the coordinate plane.

A = the velocity of the point at t = 1

B = the acceleration of the point at t = 1

C = the speed of the point at t = 1

D = $\sin\theta$ where $\theta$ is the angle formed by the tangent line and the x-axis at t = 1

Find $A+B+C\cdot D$.