

AB Calculus
Test # 4 (1–40) Review

31. Find $\frac{dy}{dx}$ for each equation:
A) $y = \sin x \cos x$ B) $y = e^x \sin x$ C) $y = x \ln x$
32. A) An antiderivative of $2x$ is: B) $\int \sin x \, dx =$ C) $\int \cos x \, dx =$
33. Sketch the graph of $y = (x - 4)(x - 2)^2(x^2 + 3)(x + 5)^3(x + 7)^2$.
34. A) Find $\frac{dy}{dx}$ if $xy + 3 = x^2y^3 - 2x$.
B) Find the equation of the line that is tangent to $2x^2 - 3y^3 = 5$ at the point $(2, 1)$.
35. A) $\int 3 \cos x \, dx =$ B) $\int \frac{2}{3}x^4 \, dx =$ C) $\int x^e \, dx =$ D) $\int \frac{3}{5}\sqrt[3]{x^2} \, dx =$
36. A) What is a singular number? B) Where does a derivative not exist?
C) What is a stationary number?
D) We always look for max/mins at _____, which are numbers where _____.
E) Sketch the graph of $y = x^3 + \frac{9}{2}x^2 + 6x + 5$ by first finding the x-y coordinates of all the max/mins and inflection points.
37. Find $\frac{dy}{dx}$ by using u-substitution if:
A) $y = (3x^2 + 6x - 3)^3$ B) $y = \sin(\ln x)$ C) $y = \ln(6x^{-3})$
38. $\int \left(\frac{2}{7}x^{2/3} + 3e^x - 4\sin x + \frac{2}{5}x^{-1} - 2.4 \right) dx =$
39. A) Estimate the area under $y = x^2 + 2$ on the interval $[2, 4]$ by using 4 upper rectangles.
B) Estimate the area under $y = \cos x$ on the interval $[-\pi/2, \pi/2]$ by using 6 left rectangles.
C) Estimate the area under $y = 2x + 4$ on the interval $[0, 3]$ with 4 midpoint rectangles.
40. A) Find the slope of the line normal to the graph of $y = 3e^{2x}$ at the point where $x = 1.27$.
B) The position of a particle is given by $x(t) = 6t^3 - 4t^2 + 3t - 1$. What is the particle's acceleration at $t = 2$ seconds?
C) Find $f'(-3.57)$ if $f(x) = \ln(\sin x) \cdot \cos(3x^2 - 7x + 4)$.
D) Find the x-y coordinates of the local max/mins of $y = \frac{\cos^2 x + \ln(x^2)}{x^3}$.