

# 1 Class 1 - Ada Lovelace - Derivatives and anti-derivatives (Solutions)

$$\begin{array}{ll}
 C + \frac{x}{2} & (1) \\
 -5\pi^{-5t} \log(\pi) & (2) \\
 \frac{t}{2} & (3) \\
 \frac{5nt^n}{bt} & (4) \\
 \frac{15}{2} \pi^{\frac{3t}{2}} \log(\pi) & (5) \\
 C - \frac{a}{2} e^{-x} & (6) \\
 \frac{2e^{\frac{2t}{3}}}{3b} & (7) \\
 C - \frac{2\pi^{-kt}}{k \log(\pi)} & (8) \\
 C + \frac{2t^2}{5} & (9) \\
 C + \frac{x}{4} & (10) \\
 C + \frac{t^4}{2b} & (11) \\
 0 & (12) \\
 4 & (13) \\
 e^{\frac{x}{3}} & (14) \\
 \frac{15}{b} 5^{5x} \log(5) & (15) \\
 \frac{4^{\frac{4t}{3}}}{4 \log(2)} + C & (16) \\
 0 & (17) \\
 0 & (18) \\
 \frac{3^x a}{b} \log(3) & (19) \\
 \frac{4k}{9} 3^{\frac{kx}{3}} \log(3) & (20) \\
 C + \frac{3}{b} \left( \begin{cases} \log(t) & \text{for } n = -1 \\ \frac{t^{n+1}}{n+1} & \text{otherwise} \end{cases} \right) & (21)
 \end{array}
 \begin{array}{ll}
 \frac{6\sqrt{x}}{5} & (22) \\
 \frac{1}{3} & (23) \\
 C + \frac{x}{2} & (24) \\
 \frac{3\sqrt{t}}{4} & (25) \\
 \frac{5k}{4} 4^{kt} \log(4) & (26) \\
 -\frac{8}{x^5} & (27) \\
 4 \cdot 3^{2t} \log(3) & (28) \\
 -\pi^{-\frac{t}{2}} \log(\pi) & (29) \\
 C + \frac{x^2}{3} & (30) \\
 \frac{2^{3x}}{3 \log(2)} + C & (31) \\
 C + \frac{5}{4} \left( \begin{cases} \log(t) & \text{for } -n = -1 \\ \frac{t^{-n+1}}{-n+1} & \text{otherwise} \end{cases} \right) & (32) \\
 -\frac{5}{2bt^{\frac{3}{2}}} & (33) \\
 \frac{3}{10} 2^{\frac{x}{2}} \log(2) & (34) \\
 C - \frac{a}{12t^3} & (35) \\
 C + 3x & (36) \\
 \frac{2 \cdot 4^{5t}}{5b \log(2)} + C & (37) \\
 \frac{5 \cdot 3^x}{3 \log(3)} + C & (38) \\
 C + \frac{5}{6} e^{2t} & (39) \\
 \frac{2^t}{b} \log(2) & (40) \\
 -\frac{1}{3t^2} & (41)
 \end{array}$$

$$\begin{aligned} \frac{4}{5}e^{2t} & (42) & \frac{\pi^t a}{3 \log(\pi)} + C & (65) \\ \frac{9x^2}{4} & (43) & C + \frac{6t^{\frac{5}{3}}}{25} & (66) \\ C - \frac{a}{t} & (44) & C + \frac{3t^{\frac{5}{3}}}{5} & (67) \\ \frac{3\pi^x}{4 \log(\pi)} + C & (45) & \frac{2 \cdot 5^{kx}}{k \log(5)} + C & (68) \\ \frac{5}{4}3^{\frac{x}{2}} \log(3) & (46) & 2x & (69) \\ \frac{2\pi^x}{b \log(\pi)} + C & (47) & \frac{5^{4t}}{20 \log(5)} + C & (70) \\ -3^{-kt} k \log(3) & (48) & C - \frac{a}{15t^3} & (71) \\ \frac{4 \cdot 2^{5x}}{25 \log(2)} + C & (49) & \frac{3^t}{3} \log(3) & (72) \\ 0 & (50) & \frac{12}{b} 3^{3x} \log(3) & (73) \\ C + \frac{x^3}{3} & (51) & \frac{3t}{2} & (74) \\ \frac{5 \cdot 3^{2t}}{8 \log(3)} + C & (52) & \frac{2t}{b} a & (75) \\ 0 & (53) \\ \frac{nt^{\frac{n}{3}}}{9t} & (54) \\ C - \frac{3^{-5x}}{20 \log(3)} & (55) \\ C + t^3 & (56) \\ C + \frac{2}{b} \log(t) & (57) \\ 2x^3 & (58) \\ C + a \left( \begin{cases} \log(x) & \text{for } n = -1 \\ \frac{x^{n+1}}{n+1} & \text{otherwise} \end{cases} \right) & (59) \\ -\frac{3^{-\frac{t}{2}}}{2b} \log(3) & (60) \\ -\frac{4}{5} 5^{-\frac{4x}{3}} \log(5) & (61) \\ C + \frac{4x^{\frac{7}{3}}}{7} & (62) \\ C + \frac{x^2}{4} & (63) \\ C + \frac{4t^5}{5} & (64) \end{aligned}$$

## 2 Class 1 - Grace Hopper - Derivatives and anti-derivatives (Solutions)

$$C + \frac{3}{8}e^{\frac{4x}{3}} \quad (1) \quad C + \frac{3x^2}{10} \quad (20)$$

$$\frac{2\pi^t}{\log(\pi)} + C \quad (2) \quad \frac{2 \cdot 4^{kx}}{k \log(2)} + C \quad (21)$$

$$C + \frac{x^5}{10} \quad (3) \quad C + \frac{3}{4} \left( \begin{cases} \log(t) & \text{for } \frac{n}{2} = -1 \\ t^{\frac{n}{2}+1} & \text{otherwise} \end{cases} \right) \quad (22)$$

$$\frac{anx^n}{4x} \quad (4) \quad C + \frac{e^{4x}}{4b} \quad (23)$$

$$-\frac{3}{t^4} \quad (5) \quad \frac{10x}{b} \quad (24)$$

$$C + \frac{5}{3}e^{3x} \quad (6) \quad 2\sqrt[3]{x} \quad (25)$$

$$-\frac{3k}{5}\pi^{-kx} \log(\pi) \quad (7) \quad \frac{4k}{3}4^{\frac{kx}{3}} \log(4) \quad (26)$$

$$\pi^{2t} \log(\pi) \quad (8) \quad C + \frac{2}{5} \left( \begin{cases} \log(x) & \text{for } -n = -1 \\ \frac{x^{-n+1}}{-n+1} & \text{otherwise} \end{cases} \right) \quad (27)$$

$$3 \quad (9) \quad t \quad (28)$$

$$C + \frac{1}{4} \left( \begin{cases} \log(x) & \text{for } -n = -1 \\ \frac{x^{-n+1}}{-n+1} & \text{otherwise} \end{cases} \right) \quad (10) \quad C + \frac{2x^2}{5} \quad (29)$$

$$\frac{3\pi^{\frac{4x}{3}}}{4 \log(\pi)} + C \quad (11) \quad \frac{9t^2}{b} \quad (30)$$

$$C + \frac{3}{b} \log(t) \quad (12) \quad \frac{3a}{2} 3^{3x} \log(3) \quad (31)$$

$$\frac{4^{\frac{5x}{2}}}{4 \log(2)} + C \quad (13) \quad C + \begin{cases} \log(t) & \text{for } -n = -1 \\ \frac{t^{-n+1}}{-n+1} & \text{otherwise} \end{cases} \quad (32)$$

$$2\pi^{5x} \log(\pi) \quad (14) \quad 3 \cdot 5^{3t} \log(5) \quad (33)$$

$$C - \frac{5^{-x}a}{4 \log(5)} \quad (15) \quad 3 \cdot 2^{3x} \log(2) \quad (34)$$

$$\frac{ak}{3} 5^{\frac{kt}{3}} \log(5) \quad (16) \quad C + \frac{3t^5}{5} \quad (35)$$

$$\frac{3a}{5} x^2 \quad (17) \quad \frac{5^{3t}}{4 \log(5)} + C \quad (36)$$

$$\frac{25\pi^{\frac{5t}{2}}}{2b} \log(\pi) \quad (18) \quad C + \frac{4t}{3} \quad (37)$$

$$C + \frac{a}{5} \left( \begin{cases} \log(x) & \text{for } n = -1 \\ \frac{x^{n+1}}{n+1} & \text{otherwise} \end{cases} \right) \quad (19) \quad -\frac{2}{15t^{\frac{4}{3}}} \quad (38)$$

$$C + \frac{5x}{4} \quad (40)$$

$$\frac{a}{3} 4^{\frac{5t}{3}} \log(4) \quad (41)$$

$$2\pi^x \log(\pi) \quad (42)$$

$$0 \quad (43)$$

$$-\frac{3}{x^3} \quad (44)$$

$$-\frac{4a}{b} e^{-4x} \quad (45)$$

$$\frac{3 \cdot 2^{\frac{2t}{3}}}{8 \log(2)} + C \quad (46)$$

$$\frac{3a}{b} 3^{3t} \log(3) \quad (47)$$

$$\frac{6t}{b} \quad (48)$$

$$2ke^{kt} \quad (49)$$

$$\frac{2t}{3} a \quad (50)$$

$$\frac{\pi^{kt} a}{4k \log(\pi)} + C \quad (51)$$

$$\frac{2\pi^x}{b \log(\pi)} + C \quad (52)$$

$$3 \cdot 3^{\frac{3x}{2}} \log(3) \quad (53)$$

$$-\frac{4^{-t}}{2} \log(4) \quad (54)$$

$$C + \frac{5t}{2} \quad (55)$$

$$\frac{12}{b} e^{4x} \quad (56)$$

$$\frac{10}{b} 2^{2x} \log(2) \quad (57)$$

$$0 \quad (58)$$

$$-4\pi^{-4t} \log(\pi) \quad (59)$$

$$C - \frac{5 \cdot 5^{-2x}}{2b \log(5)} \quad (60)$$

$$\frac{6 \cdot 5^{\frac{t}{2}}}{5 \log(5)} + C \quad (61)$$

$$\frac{10}{3} 5^{5x} \log(5) \quad (62)$$

$$\frac{6x}{5} \quad (63)$$

$$C + \frac{ax^3}{6} \quad (64)$$

$$C + \frac{3x}{4} \quad (65)$$

$$C + \frac{ax^3}{15} \quad (66)$$

$$\frac{2^{4t}}{4 \log(2)} + C \quad (67)$$

$$-\frac{6}{b} e^{-3t} \quad (68)$$

$$C + \frac{e^{2x}}{6} \quad (69)$$

$$0 \quad (70)$$

$$\frac{10\pi^{\frac{2t}{3}}}{3b} \log(\pi) \quad (71)$$

$$C - \frac{1}{3} e^{-5x} \quad (72)$$

$$-\frac{1}{2x^{\frac{3}{2}}} \quad (73)$$

$$2 \quad (74)$$

$$C + \frac{t^4}{4} \quad (75)$$

### 3 Class 1 - Jean Jennings Bartik - Derivatives and anti-derivatives (Solutions)

$$\begin{array}{ll}
 & C + \frac{x^2}{6} \quad (22) \\
 2\sqrt{t} & (1) \quad 2t \quad (23) \\
 \frac{1}{3} & (2) \quad \frac{a}{5} \quad (24) \\
 \frac{12}{5}3^{4t}\log(3) & (3) \quad 1 \quad (25) \\
 & 3x^2 \quad (26) \\
 \frac{4^xa}{2b\log(2)} + C & (4) \quad -\frac{5k}{2}5^{-kx}\log(5) \quad (27) \\
 C - \frac{5 \cdot 5^{-2x}}{2b\log(5)} & (5) \quad -\frac{4}{t^5} \quad (28) \\
 0 & (6) \quad C + \frac{2t^3}{3} \quad (29) \\
 C + \frac{t^2}{4} & (7) \quad \frac{2 \cdot 2^{kt}}{3k\log(2)} + C \quad (30) \\
 2^{2t}\log(2) & (8) \quad \frac{5^{\frac{3t}{2}}}{3\log(5)} + C \quad (31) \\
 \frac{3 \cdot 5^{4t}}{4b\log(5)} + C & (9) \quad C + \frac{e^{2t}}{4} \quad (32) \\
 C + x & (10) \quad C - \frac{3^{-kt}}{k\log(3)} \quad (33) \\
 4^xa\log(4) & (11) \quad C + \frac{ax^4}{12} \quad (34) \\
 C + \frac{4x^5}{5} & (12) \quad 1 \quad (35) \\
 C + \frac{x^4}{4} & (13) \quad \frac{5nt^n}{bt} \quad (36) \\
 \frac{5t}{2} & (14) \quad \frac{3 \cdot 3^{2x}}{8\log(3)} + C \quad (37) \\
 \frac{\pi^{kt}}{2k\log(\pi)} + C & (15) \quad C + \frac{t^{\frac{5}{2}}}{2} \quad (38) \\
 \frac{3 \cdot 2^{5x}}{20\log(2)} + C & (16) \quad \frac{4^{\frac{x}{2}}}{b\log(2)} + C \quad (39) \\
 C + \frac{t^2}{2} & (17) \quad C + \frac{ax^3}{12} \quad (40) \\
 C + x & (18) \quad 6x^2 \quad (41) \\
 \frac{2 \cdot 2^t}{\log(2)} + C & (19) \quad -\frac{5}{2}4^{-5t}\log(4) \quad (42) \\
 -\frac{a}{4}3^{-x}\log(3) & (20) \\
 0 & (21)
 \end{array}$$

$$\frac{\pi^t}{3 \log(\pi)} + C \quad (43)$$

$$\frac{5\pi^t}{2} \log(\pi) \quad (44)$$

$$\frac{3^{2t}}{2 \log(3)} + C \quad (45)$$

$$C + 3\sqrt[3]{t} \quad (46)$$

$$\frac{2^{2t}a}{2 \log(2)} + C \quad (47)$$

$$\frac{25}{3} 3^{5x} \log(3) \quad (48)$$

$$C + \frac{t^2}{2} \quad (49)$$

$$C + \frac{4x^{\frac{3}{2}}}{15} \quad (50)$$

$$C + \frac{t^4}{3} \quad (51)$$

$$\frac{3a}{5} t^2 \quad (52)$$

$$C + \frac{e^{2t}}{b} \quad (53)$$

$$5 \cdot 3^{5t} a \log(3) \quad (54)$$

$$C + \begin{cases} \log(t) & \text{for } \frac{n}{2} = -1 \\ \frac{t^{\frac{n}{2}+1}}{\frac{n}{2}+1} & \text{otherwise} \end{cases} \quad (55)$$

$$10t \quad (56)$$

$$\frac{\pi^{5x}a}{15 \log(\pi)} + C \quad (57)$$

$$\frac{4^{4x}}{4b \log(2)} + C \quad (58)$$

$$2\pi^{4t} a \log(\pi) \quad (59)$$

$$\frac{3^{3t}a}{3 \log(3)} + C \quad (60)$$

$$C + \frac{ax}{4} \quad (61)$$

$$5 \cdot 3^{2x} \log(3) \quad (62)$$

$$-\frac{1}{x^2} \quad (63)$$

$$0 \quad (64)$$

$$\frac{2x}{3} \quad (65)$$

$$2 \cdot 3^{4x} \log(3) \quad (66)$$

$$C + \frac{5x}{3} \quad (67)$$

$$C + \frac{ax^{\frac{5}{2}}}{10} \quad (68)$$

$$C + \frac{5}{b} \left( \begin{cases} \log(t) & \text{for } n = -1 \\ \frac{t^{n+1}}{n+1} & \text{otherwise} \end{cases} \right) \quad (69)$$

$$C + x^4 \quad (70)$$

$$3 \quad (71)$$

$$\frac{20t^3}{3} \quad (72)$$

$$\frac{3^{2t}a}{2b \log(3)} + C \quad (73)$$

$$C + \frac{x}{3} \quad (74)$$

$$C + 2 \left( \begin{cases} \log(x) & \text{for } -n = -1 \\ \frac{x^{-n+1}}{-n+1} & \text{otherwise} \end{cases} \right) \quad (75)$$