Basic Differentiation Rules

1. Differentiating a constant: If f(x) = k (a constant), then f'(x) = ______

   a) 5 = b) 10 = c) – 13 = d) 1/3 =

2. Differentiating a variable to a power: If $f(x) = x^n, then\ f'(x) =$ _______

   a) $x =$ b) $x^2 =$ c) $x^3 =$ d) $x^{\frac{2}{3}} =$

   e) $x^{\frac{7}{2}} =$ f) $x^{-5} =$ g) $x^{-10} =$

3. Differentiating a constant times a variable to a power: If $f(x) = cx^n, then\ f'(x) =$ ______

   a) $3x^2 =$ b) $5x^4 =$ c) $-4x^{-3} =$ d) $6x^{\frac{5}{3}} =$

4. Differentiating a sum or difference: If $f(x) = g(x) + h(x), then\ f'(x) =$ ____________

   a) $3x + 7 =$ b) $x^2 - x =$ c) $3x^3 + 5x^2 =$ d) $-4x^{-3} + 5x^4 =$

5. Differentiating the natural log (ln): If $f(x) = \ln x, then\ f'(x) =$ __________

   If $f(x) = \ln cx, then\ f'(x) =$ __________

   If $f(x) = \ln x^n, then\ f'(x) =$ __________

   If $f(x) = \ln^n x, then\ f'(x) =$ __________

   If $f(x) = (\ln x)^n, then\ f'(x) =$ __________

   a) $\ln x =$ b) $\ln(3x) =$ c) $\ln(7x) =$ d) $\ln x^2 =$

   e) $\ln x^3 =$ f) $\ln x^6 =$ g) ln 5 = h) $\ln^2 x =$

   i) $\ln^3 x =$ j) $\ln^4(x^2) =$ k) $(\ln x)^2 =$ l) $(\ln x)^3 =$

6. Differentiating the log : If $f(x) = \log_n x, then\ f'(x) =$ __________

   If $f(x) = \log_n cx, then\ f'(x) =$ __________

   If $f(x) = \log_n x^m, then\ f'(x) =$ __________

   a) $\log x =$ b) $\log(3x) =$ c) $\log(7x) =$ d) $\log x^2 =$

   e) $\log x^3 =$ f) $\log x^6 =$ g) log 5 = h) $\log_3 x =$

i) $\log_5 x =$ j) $\log_7 x =$ k) $\log_3 x^2 =$ l) $\log x^3 =$

7. Differentiating "e" : If $f(x) = e^x, then\ f'(x) =$ ________
If $f(x) = e^{x^n}, then\ f'(x) =$ ________

a) $e^x =$ b) $e^{2x} =$ c) $e^{5x} =$ d) $e^{7x} =$

e) $e^{x^2} =$ f) $e^{x^3} =$ g) $e^{x^7} =$

8. Differentiating "a" ("a" is a constant) : If $f(x) = a^x, then\ f'(x) =$ ________
If $f(x) = a^{x^n}, then\ f'(x) =$ ________

a) $3^x =$ b) $5^{2x} =$ c) $7^{5x} =$ d) $2^{7x} =$

e) $4^{x^2} =$ f) $6^{x^3} =$ g) $7^{x^7} =$

9. Differentiating sin: If $f(x) = \sin x, then\ f'(x) =$ ____________
If $f(x) = \sin cx, then\ f'(x) =$ ____________
If $f(x) = \sin x^n, then\ f'(x) =$ ____________
If $f(x) = \sin^n x, then\ f'(x) =$ ____________
If $f(x) = (\sin x)^n, then\ f'(x) =$ ____________

a) $\sin x =$ b) $\sin 3 =$ c) $\sin(2x) =$ d) $\sin(5x) =$

e) $\sin(x^2) =$ f) $\sin(x^3) =$ g) $\sin^2 x =$ h) $\sin^3 x =$

i) $\sin^4(3x) =$ j) $\sin^5(4x) =$ k) $(\sin x)^2 =$ l) $(\sin x)^4 =$

10. Differentiating cos: If $f(x) = \cos x, then\ f'(x) =$ ____________
If $f(x) = \cos cx, then\ f'(x) =$ ____________
If $f(x) = \cos x^n, then\ f'(x) =$ ____________
If $f(x) = \cos^n x, then\ f'(x) =$ ____________
If $f(x) = (\cos x)^n, then\ f'(x) =$ ____________

a) $\cos x =$ b) $\cos 3 =$ c) $\cos(2x) =$ d) $\cos(5x) =$

e) $\cos(x^2) =$ f) $\cos(x^3) =$ g) $\cos^2 x =$ h) $\cos^3 x =$

i) $\cos^4(3x) =$ j) $\cos^5(4x) =$ k) $(\cos x)^2 =$ l) $(\cos x)^4 =$