Lecture 36: Worksheet

This worksheet was authored by Sofia [1], an artificial intelligence calculus teacher and student! The bot could also learn evenso only in a primitive way. It had to be told "learn: ...". This entire LaTeX file was generated automatically, (except for this introduction section which has, (thanks to **this** parenthesis) become self-aware and so artificially intelligent.)

Derivatives

Differentiate the following functions: Level 1

1   a) $f(x) = x\tan(x)$
   b) $f(x) = x + \tan(x)$
   c) $f(x) = x\log(x)$
   d) $f(x) = e^{-x}x$
   e) $f(x) = \cos(x)$

Integrals

Integrate the following functions: Level 1

1   a) $f(x) = \frac{1}{x^2} + 1$
   b) $f(x) = \sec^2(x)$
   c) $f(x) = 1 - \sin(x)$
   d) $f(x) = \sec^2(x) + 1$
   e) $f(x) = \frac{1}{2\sqrt{x}}$

Derivatives

Differentiate the following functions: Level 2

1 a) $f(x) = x^{3/2} \sec(x)$
  b) $f(x) = e^{-x}(x + \sin(x))$
  c) $f(x) = 0$
  d) $f(x) = e^{-x}\sqrt{x}$
  e) $f(x) = \frac{e^x}{\log(e^x)}$

Integrals

Integrate the following functions: Level 2

1 a) $f(x) = \frac{x^3 - 3}{x^4}$
  b) $f(x) = \frac{3\sqrt{x-3}}{2}$
  c) $f(x) = e^x(\cos(x) - \sin(x))$
  d) $f(x) = x - x\tan^2(x) - \tan(x)$
  e) $f(x) = e^x(\sin(e^x) + e^x\cos(e^x))$

Derivatives

Differentiate the following functions: Level 3

1 a) $f(x) = x^2(x - \tan(x))$
  b) $f(x) = \sqrt{x} - \log(x) + x\tan(x)$
  c) $f(x) = \frac{e^{-x}}{(x-1)x^2}$
  d) $f(x) = \frac{e^{-x}(x + \log(x))}{x}$
  e) $f(x) = x^3(x + \log(x))$

Integrals

Integrate the following functions: Level 3

1 a) $f(x) = -\frac{4x^4 + 1}{x}$
  b) $f(x) = e^{-x}((-x\log(x) + \log(x) + 1)\sin(x) + x\log(x)\cos(x))$
  c) $f(x) = e^{-2x}(1 - 2x) - \sec^2(x)$
  d) $f(x) = e^x + \sec^2(x)$
  e) $f(x) = \frac{(\log(x) - 2)\cos(\sqrt{x}) - \sqrt{x}\log(x)\sin(\sqrt{x})}{\sqrt{x}\log^2(x)}$

Derivatives

Differentiate the following functions: Level 4

1 a) $f(x) = \frac{\sin^3(x)+\sin(x)+\sin(\sin(x))}{x+1}$

b) $f(x) = \left(x^3 - \sqrt{x^3} - x - 4\right)\csc(x)$

c) $f(x) = \left(e^{-3x} - 9x\right)\cot(x)$

d) $f(x) = e^{-x}((x-3)(x-2) - \cos(x))$

e) $f(x) = \frac{\sqrt{e^x}-3x}{3x}$

Derivatives

Differentiate the following functions: Level 6

1 a) $f(x) = \frac{1}{x^{3/2}} + \frac{(\sqrt{x}+\log(\sqrt{x}))\cos\ (\sqrt{x})\cot(\sqrt{x})}{\sqrt{x}+3}$

b) $f(x) = -(x+3)\sin^{\frac{3}{2}}(x)(\tan(\sin(x)) - \log(\tan(\sin(x))))$

c) $f(x) = \frac{1}{x^2} - \frac{2x\left(\frac{x}{\log(x)}-\log(x)\right)}{x+1} + \sin\ (x)$

d) $f(x) = x^5\left(x^4 - x + e^x - \cos(x)\right) - x^3$

e) $f(x) = \sec(x)\left(\sin^6(x) + \sin(\sin(x)) + \tan(\sin(x))\right) - e^x$

Integrals

Integrate the following functions: Level 4

1 a) $f(x) = \frac{-\sqrt{x}(x-6)+2(x-2)x\sin(x)+2(x-4)\cos(x)}{2x^3}$

b) $f(x) = x^4 + (x-2)\left(4x^3 - \cos(x) - \sec^2(x)\right) - \sin(x) - \tan(x)$

c) $f(x) = -\frac{e^{\frac{1}{x}}\left(3\sec^2\left(\frac{1}{x^3}\right)+(3x+1)x^2\ \tan\left(\frac{1}{x^3}\right)\right)}{x^7}$

d) $f(x) = -\frac{2\tan(\log(x))+\frac{\sin(\log(x))}{\sqrt{\cos(\log(x))}}}{2x}$

e) $f(x) = 6\tan^5(x)\sec^2(x)$

Integrals

Integrate the following functions: Level 6

1 a) $f(x) = \frac{\sec(x)\left(\sec(x)\log(\tan(x))\left(8\sqrt{\tan(x)}-\sin\ \left(\sqrt{\tan(x)}\right)+3\sin\left(3\sqrt{\tan(x)}\right)\right)-\right.}{8\sqrt{\tan\ (x)}\log^2(\text{ta}}$

b) $f(x) = \frac{1}{2}\left(\frac{1}{\sqrt{x}} - \frac{e^{-x}\left(\frac{6}{\log^4(x)}+\frac{1}{(\log(x)-2)^2}\right)}{x} - 2e^{-x}\left(\frac{1}{\log^3(x)} + \frac{1}{2(\log(x)-2)}\right)\right)$

c) $f(x) = -\frac{2x^5\log(x)\sec^2(x)+2x^4(3\log(x)-1)\tan(x)+\log^2(x)}{x^2\log^2(x)}$

d) $f(x) = -\frac{5x^{7/2}+20x^6-24x^4+2}{2x^2}$

e) $f(x) = -\frac{2x^2\sqrt{\cos(x)}+x\log(x)\sin(x)+(6\log(x)-2)\cos(x)}{2\ x^4\sqrt{\cos(x)}}$