Review problems for Quiz 0

Evaluate the following antiderivatives

Problem 9.1. $\int (x^2 - 3)\, dx$

Problem 9.2. $\int (x^{-3} - 3\sqrt[4]{x} + 8\sin x)\, dx$

Problem 9.5. $\int (e^x + x^e)\, dx$

Problem 9.6. $\int (1 + 2x^2)^2\, dx$

Problem 9.7. $\int \dfrac{x^5 + 2x^3 - 1}{x^4}\, dx$

Problem 9.9. $\int \sec x(\sec x + \tan x)\, dx$

Problem 9.11. $\int x^3\sqrt{x^4 + 1}\, dx$

Problem 9.12. $\int \cos^3 x \sin x\, dx$

Problem 9.13. $\int e^{\tan(2x)} \sec^2(2x)\, dx$

Problem 9.16. $\displaystyle\int \frac{1}{x \ln x}\, dx$

Problem 9.17. $\displaystyle\int \frac{1}{1+4x^2}\, dx$

Problem 9.18. $\displaystyle\int \frac{x}{1+4x^2}\, dx$

Problem 2.2. Find the derivatives of the following functions:

a) $y = \frac{3x-1}{x^2+7}$

b) $y = e^{x^2} \sin(5x)$

c) $y = \sin^{-1}(x) \ln(3x+1)$

d) $y = \cos^3(7x)$

e) $y = \sin\left(\sqrt{x}\right) + \sqrt{\sin(x)}$

f) $y = x^2 + 2^2 + 2^x$

Problem 2.3. Find the derivatives of the following functions:

a) $y = 4x^3 - 5\cos x - \sec x + \pi^5$

b) $y = \left(x^2 - 3\right) \sin\left(2x\right)$.

c) $y = \frac{3x-1}{2x+7}$

d) $y = \sin^3\left(\tan 5x\right)$

e) $y = x^5 + 5^x + e^{3x} + \ln\left(3x\right) - \ln 7$

f) $y = \sin\left(3x\right) + \tan\left(5x\right) + \sin^{-1}\left(3x\right) + \tan^{-1}\left(5x\right)$

Problem 2.7. Find the equation of the tangent line to the given curve at the given point

a) $x^2 y + \sin y = 2\pi$ at $P(1, 2\pi)$

b) $y = 3x + e^{3x}$ at $x = 0$

c) $2x^3 - x^2 y + y^3 - 1 = 0$ at $P(2, -3)$

Problem 2.8. Find the second derivative of the following functions

a) $y = \sqrt{2x-3}$

b) $y = (5x-3)^5$

c) $y = \tan(4x)$

Problem 7.11. For each function on the indicated interval, find the absolute maximum and absolute minimum, if these exist. If one or both do not exist, specify so.

(a) $f(x) = 2x^5 - 5x^4 + 7$ on $[-1, 3]$

(b) $f(x) = x^{1/3}(x+4)$ on $[-1, 3]$

(c) $f(x) = x + \frac{1}{x}$ on $(0, +\infty)$

(d) $f(x) = x^2 e^{2x}$ on $(-\infty, 0]$

(solutions for these problems are available on Answers.pdf)

Extra problems:

a) Solve the following system of equations

$$\begin{cases} 4x-3y=2; \\ 2y-x=10 \end{cases}$$

b) Write the points P=(1,1) and Q= (2, 4) in polar coordinates (r cos t, r sin t).