Sample of Material from MAT182 at Broome Community College

This material is for sample purposes only and is not to be considered as an official listing of topics.

1. Find the derivative for each of the following functions. Simplify your answer where possible.

a) f(x) = ln(tanx) b) f(x) = $e^{1+\sin^{-1}x}$

c) f(x) = $\cos^{-1}(\ln x)$

2. Solve the following separable differential equation: $\frac{dy}{dx} = x^3 y + y$, where y(0) = 2.

3. Evaluate $\lim_{x \to 0^+} x \ln x$.

4. $\sum_{k=0}^{\infty} 7\left(\frac{2}{3}\right)^k$ is a special type you should recognize. State the type by name, state whether the series converges or diverges, and where possible, give the sum.

5. Evaluate the following integrals. Clearly show any u-substitutions or trig substitutions you make.

a) $\int \sin^3 x \cos x dx$ b) $\int \frac{e^x}{2+e^x} dx$ c) $\int x \sin x \, dx$

e) $\int \frac{2x+6}{x^2-1} dx$ d) $\int \frac{4}{\sqrt{9-x^2}} dx$

7. Evaluate $\int_4^{\infty} \frac{3}{x^6} dx$ accurate to 5 decimal places.

8. a) Graph $\begin{cases} x(t) = \cos(t) \\ y(t) = \cos(2t) \end{cases}$ on the interval t : [-π, π]. Label the (x,y) coordinates of the point at t = π/4.

b) Use Calculus and show work to find the slope of the tangent line at t = π/4.

c) Find the speed of the curve at t = π/4.

d) Set up an integral to find the arc length of the curve. Use your calculator to evaluate it.

9. a) Graph r = 4sin3θ. Use x:[-5,5] and y:[-5,5].

b) Set up an integral to find the area inside the graph. Use your calculator to evaluate it.

10. Draw the graph for the function that is the solution for $\frac{dy}{dx} = x + e^{-y}$, where y(-4) = 2 . Use x:[-5,5] and y:[-5,5]. Label both coordinates the points at x = -2, 0, 2 using two decimal places of accuracy.

11. Derive the first five terms in the Maclaurin series for $f(x) = e^{2x}$. Show work.

12. You are given $\ln(2x + 1) = \sum_{k=1}^{\infty} \frac{(-1)^{k+1}}{k}(2x)^k$.

a) Find the interval of convergence for the series above. Be sure to explain if the function converges at the endpoints of the interval.

b) How many terms do you need to approximate ln(1.2) accurate to within 0.0001? Show work, and explain how you used your calculator so I can duplicate your steps.

c) Write out the summation form for the power series as determined by your answer to b), then use the power series to estimate ln(1.2) accurate to within 0.0001. Note: show me 8 decimal places.