ONE-PAGE REVIEW

MATH 1910 Recitation

§9.1 (Arc Length and Surface Area)
§9.4 (Taylor Polynomials)
§10.1 (Differential Equations)

November 3, 2016

(1) The **arc length** of $f(x)$ on the interval $[a, b]$ is ____ (1)

(2) The **surface area** of the surface obtained by rotating the graph of $f(x)$ around the x-axis for $a \leq x \leq b$ is ____ (2)

(3) The **n-th Taylor Polynomial** centered at $x = a$ for the function f is

$$T_n(x) = \underline{\qquad\qquad} \text{ (3)}$$

(4) The **error for the n-th Taylor Polynomial** is

$$|T_n(x) - f(x)| \leq \underline{\qquad} \text{ (4)} .$$

(5) **Taylor's Theorem** says that

$$R_n(x) = T_n(x) - f(x) = \underline{\qquad\qquad} \text{ (5)}$$

(6) A **differential equation** is like a normal equation, except you solve a differential equation for a ____ (6) instead of a number.

(7) The **order** of a differential equation is the highest derivative of y appearing in the equation. What are the orders of the following equations?

	Equation	Order
(a)	$y' = x^2$	(7)
(d)	$y''' + x^4y' = 2$	(8)
(b)	$(y')^3 + yy' = \sin x$	(9)
(c)	$y'' = y^2$	(10)

(8) The technique for solving a differential equation where you move all the x-terms to one side and all of the y-terms to the other side is called ____ (11)

PRACTICE PROBLEMS

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§9.1 (Arc Length and Surface Area)
§9.4 (Taylor Polynomials)
§10.1 (Differential Equations)

November 3, 2016

(1) For the curve curve $y = \ln(\cos x)$ over the interval $[0, \pi/4]$, set up an integral to calculate:
   (a) the arc length.
   (b) the surface area when rotated around the x-axis.

(2) Approximate the arc length of the curve $y = \sin(x)$ over the interval $[0, \pi/2]$ using the midpoint rule M_8.

(3) Find the Taylor polynomials $T_2(x)$ and $T_3(x)$ for $f(x) = \frac{1}{1+x}$ centered at $a = 1$.

(4) Find n such that $|T_n(1.3) - \sqrt{1.3}| \leq 10^{-6}$, where T_n is the Taylor polynomial for $\sqrt{x}$ at $a = 1$.

(5) Find the general solutions of the following differential equations using separation of variables.
   (a) $\frac{dy}{dt} - 2y = 1$
   (b) $(1 + x^2)y' = x^3 y$

(6) Solve the initial value problem $\begin{cases} y' + 2y = 0 \\ y(\ln(2)) = 3 \end{cases}$