

Math 105 TOPICS IN MATHEMATICS

REGULAR HOMEWORK – X

April 17 (Fri), 2015

Instructor: Yasuyuki Kachi

Line #: 52920.

★ Due date: Monday, April 20th, 2015 .

★ Your paper will be collected in class. No late homework will be accepted.

Please see “Rules, Policies and Protocols” p.14 about homework policy.

[I] (6pts) Find

$$(1) \quad \frac{d}{dx} x^4. \quad (2) \quad \frac{d}{dx} x^{20}. \quad (3) \quad \frac{d}{dx} \left(\frac{1}{11} x^{11} \right).$$

[II] (6pts) Find

$$(1) \quad \frac{d}{dx} (x^6 + 2x^3). \quad (2) \quad \frac{d}{dx} (x^7 - 3x^4 + x).$$

$$(3) \quad \frac{d}{dx} \left(\frac{1}{4} x^4 - \frac{1}{2} x^3 + \frac{1}{6} x^2 - \frac{1}{30} \right).$$

[III] (4pts) Find

$$(1) \quad \frac{d}{dx} \frac{1}{9!} x^9. \quad (2) \quad \frac{d}{dx} \frac{1}{40!} x^{40}.$$

[IV] (5pts) Find

$$\frac{d}{dx} \left(1 + \frac{1}{1!} x + \frac{1}{2!} x^2 + \frac{1}{3!} x^3 + \frac{1}{4!} x^4 + \frac{1}{5!} x^5 + \frac{1}{6!} x^6 + \frac{1}{7!} x^7 + \frac{1}{8!} x^8 + \frac{1}{9!} x^9 \right).$$

[V] (9pts) Recall

$$1^2 + 2^2 + 3^2 + 4^2 + \cdots + n^2 = \frac{1}{3}n^3 + \frac{1}{2}n^2 + \frac{1}{6}n .$$

Give similar formulas for

(1) $1^3 + 2^3 + 3^3 + 4^3 + \cdots + n^3,$

(2) $1^4 + 2^4 + 3^4 + 4^4 + \cdots + n^4,$ and

(3) $1^5 + 2^5 + 3^5 + 4^5 + \cdots + n^5.$

No work necessary.