

Math 105 TOPICS IN MATHEMATICS
REGULAR HOMEWORK – VIII

March 25 (Wed), 2015

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Line #: 52920.

★ **Due date:** Monday, March 30th, 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] (4pts) Convert each of the following expression of numbers in the binary system back into the usual decimal system.

(1) 101. (2) 10011. (3) 100110.

(4) 111111111 (nine straight 1s).

[II] (4pts) Convert each of the following expressions of numbers in the usual decimal system into the binary system.

(1) 6. (2) 10. (3) 33. (4) 63.

[III] (4pts) Convert each of the following expression of numbers in the hexadecimal system back into the usual decimal system.

(1) *D*. (2) *2B*. (3) *AA*. (4) *FF*.

[IV] (4pts) Convert each of the following expressions of numbers in the usual decimal system into the hexadecimal system.

(1) 10. (2) 15. (3) 29. (4) 4095.

[V] (5pts) (1) Simplify $3^x \cdot 7^x$. (2) Simplify $a^4 \cdot a^{10}$.

(3) Simplify $(a^{\sqrt{3}})^{\sqrt{3}}$. (4) Simplify 1^e .

(5) Rewrite $a^{-\sqrt{11}}$ in the form $\frac{1}{\boxed{}}$.

[VI] (6pts) Find the limits:

(1) $\lim_{n \rightarrow \infty} \left(1 + \frac{5}{n}\right)^n = ?$ (2) $\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^n = ?$

(3) $\lim_{n \rightarrow \infty} \left(1 + \frac{\sqrt{3}}{n}\right)^n = ?$

[VII] (3pts) Agree

$$e^2 = 1 + \frac{1}{1!} \cdot 2 + \frac{1}{2!} \cdot 2^2 + \frac{1}{3!} \cdot 2^3 + \frac{1}{4!} \cdot 2^4 + \frac{1}{5!} \cdot 2^5 + \dots$$

Mimic this and write out the following quantity exactly in this format.

$$\sqrt[4]{e}.$$