EMCF27 – Math 1432, 13209

The answer sheet for this assignment can be found by logging into *CourseWare* at http://www.casa.uh.edu, selecting **Math 1432(13209)**, clicking on the **EMCF** tab at the top of the page, and selecting **EMCF27**.

Important Facts: Aside from L 'Hospital's rule, you can take advantage of the following information:

- e^x grows much faster than any power of x as $x \to \infty$. i.e. $\lim\limits_{x\to\infty} \dfrac{e^x}{x^n} = \infty$ and $\lim\limits_{x\to\infty} \dfrac{x^n}{e^x} = 0$ for every value of n (even extremely large values!!).

- $\ln(x)$ grows much slower than any power of x as $x \to \infty$. $\lim\limits_{x\to\infty} \dfrac{\ln(x)}{x^r} = 0$ and $\lim\limits_{x\to\infty} \dfrac{x^r}{\ln(x)} = \infty$ for any value of $r > 0$ (even very small values!!).

- A limit that is ∞, is one that **d**oes **n**ot **e**xist.

1. $\lim\limits_{x\to\infty} \dfrac{3x^3 + 2x^2}{e^x} =$
    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

2. $\lim\limits_{x\to\infty} \dfrac{e^x}{5000000x^{9999999}} =$
    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

3. $\lim\limits_{x\to\infty} \dfrac{x^{0.000000001}}{\ln(x)} =$
    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

4. $\lim\limits_{x\to\infty} \dfrac{\ln(x)}{x} =$

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

5. $\lim\limits_{x\to\infty} \dfrac{20x^3 + \ln(x)}{e^x} =$

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

6. $\lim\limits_{x\to 0^+} x\ln(x) =$ (Hint: $x = \dfrac{1}{1/x}$ and $\ln(x) = -\ln(1/x)$)

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

7. $\lim\limits_{x\to 0^+} x e^{1/x} =$

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

8. $\lim\limits_{x\to\infty} \left(1 - \dfrac{2}{x}\right)^{3x} =$

    a. e^6
    b. e^{-6}
    c. e^2
    d. e^{-2}
    e. DNE
    f. None of these.

9. $\lim\limits_{x \to \infty}\left(e^{2x} + 3x\right)^{2/x} =$

    a. e^4
    b. e^3
    c. e^2
    d. e
    e. DNE
    f. None of these.

10. $\lim\limits_{x \to 0^+} x\sin\left(2/x\right) =$

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

11. $\lim\limits_{x \to \infty}\left(1 + \dfrac{1}{x}\right)^{\ln(x)} =$

    a. 3
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.

12. $\lim\limits_{x \to \infty} \dfrac{3x^3 + 2x^2}{5x^3 + 2x + 1} =$

    a. 0
    b. 1/5
    c. 3/5
    d. 2/5
    e. DNE
    f. None of these.

13. $\lim\limits_{x \to \infty} \dfrac{x^2 e^x}{e^{2x}} =$

    a. e
    b. $2e$
    c. 1
    d. 0
    e. DNE
    f. None of these.

14. $\lim\limits_{x\to\infty}\dfrac{8x\ln(x)}{x\sqrt{x}+1}=$

    a.   4
    b.   8
    c.   1
    d.   0
    e.   DNE
    f.   None of these.

15. $\lim\limits_{x\to\infty}\dfrac{\sin(x)}{2x}=$

    a.   2
    b.   1/2
    c.   1
    d.   0
    e.   DNE
    f.   None of these.

16. $\lim\limits_{x\to0^{+}}\dfrac{1-\cos(x)}{x^2}=$

    a.   2
    b.   1/2
    c.   1
    d.   0
    e.   DNE
    f.   None of these.

17. $\lim\limits_{x\to0}\dfrac{1-e^{x}}{\sin(2x)}=$

    a.   1/2
    b.   2
    c.   1
    d.   0
    e.   DNE
    f.   None of these.

18. $\lim\limits_{x\to0}\dfrac{x-\sin(x)}{x^2}=$

    a.   2
    b.   1/2
    c.   1
    d.   0
    e.   DNE
    f.   None of these.

19. $\lim\limits_{x \to \infty} 3x^3 e^{-2x} =$

    a. 3
    b. 6
    c. 1
    d. 0
    e. DNE
    f. None of these.

20. $\lim\limits_{x \to \infty} e^{-x} \ln(x) =$

    a. e
    b. 2
    c. 1
    d. 0
    e. DNE
    f. None of these.