

# Key

**EE322 Fall 2007: Quiz 1 Basic Math (Take Home Quiz)**  
**No Calculators! Work Independently!**

1. Simplify:  $e^5 \cdot e^{-2} = \boxed{e^3}$

2. Simplify:  $\frac{10^5}{2 \times 10^2} = \frac{1 \times 10^5}{2 \times 10^2} = 0.5 \times 10^3 = \boxed{500}$

3. Simplify:  $\int (x+1) dx = \boxed{\frac{x^2}{2} + x}$

4. Simplify:  $\int 2e^{-2x} dx = \boxed{-e^{-2x}}$

5. Solve:  $\int_0^1 t dt = \boxed{\frac{t^2}{2} \Big|_0^1 = \frac{1}{2}}$

6. Solve:  $\int_0^3 4e^{2t} dt = \boxed{4\left(\frac{1}{2}\right)e^{2t} \Big|_0^3 = 2e^6 - 2}$

7. Solve:  $\int_{-1}^1 \cos 2\pi t dt = \boxed{\frac{1}{2\pi} \sin 2\pi t \Big|_{-1}^1 = \frac{1}{2\pi} [\sin(\sqrt{2\pi})^0 - \sin(-\sqrt{2\pi})^0] = 0}$

8. Solve:  $\int_{-1}^1 (2t+t^2) dt = \boxed{t^2 + \frac{t^3}{3} \Big|_{-1}^1 = \left(1 + \frac{1}{3}\right) - \left(1 - \frac{1}{3}\right) = \frac{2}{3}}$

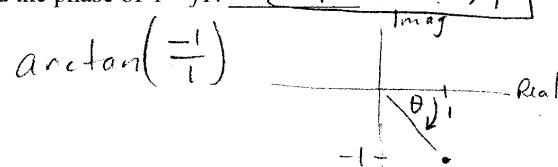
9. Simplify:  $\frac{d}{dt} 4e^{5t} = \boxed{20e^{5t}}$

10. Simplify:  $\frac{d}{dt} \sin 2\pi 20t = \boxed{2\pi 20 \cos(2\pi 20t)}$

11. Simplify:  $\frac{d}{dt} (3t+10t^5) = \boxed{3 + 50t^4}$

12. Find the magnitude:  $\left| \frac{3+j4}{-3-j4} \right| = \frac{\sqrt{3^2+4^2}}{\sqrt{(-3)^2+(-4)^2}} = \frac{5}{5} = 1$

13. Find the phase of  $1-j1$ :  $\boxed{-45^\circ \text{ or } -\pi/4}$



14. Simplify:  $10 \log_{10} 100 = 10 \cdot 2 = \boxed{20}$

15. Simplify:  $10 \log_{10} 0.01 = 10 \cdot (-2) = \boxed{-20}$

16. Simplify:  $10 \log_{10} 10^6 = 10 \cdot 6 = \boxed{60}$

17. Simplify:  $10 \log_{10} \left( \frac{2000}{0.2} \right) = 10 \log_{10} (1 \times 10^4) = 10 \cdot 4 = \boxed{40}$

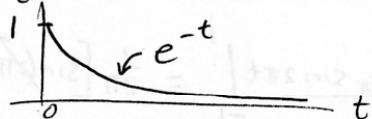
18. Simplify:  $10 \log 50 - 10 \log 5 = 10 \log_{10} \left( \frac{50}{5} \right) = 10 \log_{10} (10) = \boxed{10}$

19. Simplify:  $10 \log 50 + 10 \log 20 = 10 \log_{10} (50 \cdot 20) = 10 \log_{10} (1000) = \boxed{30}$

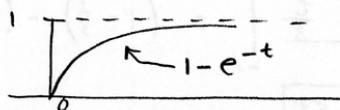
20. A cosine signal that has a frequency of 100 Hz has a period of  $\frac{1}{100} = \boxed{0.01 \text{ sec}}$

21. The integral of a cosine signal over one period is 0?

22. Sketch a plot of voltage signal  $e^{-t}$  for  $t \geq 0$ . Label the axes.

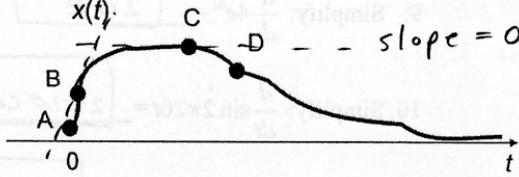


23. Sketch a plot of voltage signal  $1 - e^{-t}$  for  $t \geq 0$ . Label the axes.



A function  $x(t)$  is plotted to the right. Use it to answer the remaining questions.

24. At which point (A, B, C, D) is the first derivative equal to 0? C



25. At which point(s) is the first derivative positive? B

*note: slope at A is undefined*

26. Write an expression to find the area of the shaded region.

$$\boxed{\text{Area} = \int_4^6 x(t) dt}$$

