

MAC2311 Section U20
Suggested problems for Test 3
(Test 3 is Friday November 17th, in class)

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1. Find dy/dx .

$$y = e^{7x}$$

2. Find dy/dx .

$$y = e^{-5x^2}$$

3. Find dy/dx .

$$y = x^3 e^x$$

4. Find dy/dx .

$$y = e^{1/x}$$

5. Find dy/dx .

$$y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$$

6. Find dy/dx using any correct method.

$$y = x^{\sin x}$$

7. Find dy/dx using any correct method.

$$y = (x^3 - 2x)^{\ln x}$$

8. Find dy/dx .

$$y = \sin^{-1} x$$

9. Find dy/dx .

$$y = \frac{1}{\tan^{-1} x}$$

10. There is a circular oil spill whose radius is increasing at a constant rate of 2 ft/sec. How fast is the area of the spill increasing when the radius of the spill is 60 ft?

11. A 13 ft ladder is leaning against a wall. If the top of the ladder slips down the wall at 2 ft/sec, how fast will the bottom be moving away from the wall when the top is 5 ft above the ground?

12. Find the local linear approximation of the function $f(x) = \sqrt{1+x}$ at $x_0 = 0$, and use it to estimate $\sqrt{0.9}$ and $\sqrt{1.1}$.

13. Find the local linear approximation of the function $f(x) = \frac{1}{1+x}$ at $x_0 = 0$, and use it to estimate $\frac{1}{1.02}$ and $\frac{1}{1.03}$.

14. Evaluate the limit.

$$\lim_{x \rightarrow 0} \frac{x^2}{\sin x}$$

15. Evaluate the limit.

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{\sin x}$$

16. Evaluate the limit.

$$\lim_{x \rightarrow 0} \frac{\sin 2x}{\sin 5x}$$

17. Evaluate the limit.

$$\lim_{x \rightarrow 0} (1 - 3x)^{1/x}$$

18. Evaluate the limit.

$$\lim_{x \rightarrow \infty} (\ln x)^{1/x}$$

19. Evaluate the limit.

$$\lim_{x \rightarrow \infty} x^{1/\ln x}$$

20. Two cars leave my house at noon. One drives straight north at a uniform speed of 40 miles per hour, and the other drives straight east at a uniform speed of 30 miles per hour. At exactly 1 pm, find the rate at which the diagonal distance between the cars is increasing.