MA 22000 Review Problems for Exam 3

For problems 1, 2, and 3: Find equation of any vertical or horizontal asymptotes. If there are none, write 'none'.

1) $y = \dfrac{-2x}{x^2 - 5x + 6}$

2) $f(x) = \dfrac{3x^2 - 3x - 6}{2x^2 - 6x - 20}$

3) $g(x) = \dfrac{2x^3 + 3x}{5x - 1}$

Solve each exponential equation.

4) $3^{x+1} = \dfrac{1}{27}$

5) $4^{2x+1} = 8^{x-3}$

6) $27^x = 9^{x^2+x}$

Compound interest formulas: $A = P\left(1 + \dfrac{r}{m}\right)^{mt}$ $A = Pe^{rt}$

7) Find the accumulated amount if \$5000 is invested at 6% annual interest compounded quarterly for 6 years.

8) How long would it take (to the nearest tenth of a year) for \$1000 to accumulate to \$1250 at 4% annual interest rate compounded continuously?

9) Write $4^{0.5} = 2$ in logarithmic form.

10) Use your calculator to approximate $\ln 35.6$ and $e^{2.3}$.

11) Use your calculator and the change of base formula to approximate $\log_3 17$ to 4 decimal places.

Solve each equation. Round to 4 decimal places, if necessary.

12) $\log_6(x+1) = 2$

13) $\log(x+5) + \log(x+2) = 1$

14) $3^{x+2} = 7^x$

15) Suppose $\log_b 2 = x$ and $\log_b 5 = y$. Use the properties of logarithms to find $\log_b 20$.

16) Evaluate $\log_4 64$ and $\log_3 \dfrac{1}{9}$ without a calculator.

17) Use the properties of logarithms to write the expression as a sum, difference, or product of simpler logarithms. Simplify where possible.

$$\log_4\left(\frac{16p}{\sqrt{q}}\right)$$

18) Find each limit, if it exists. (*a*) $\lim_{x\to\infty}\frac{3x^2-5}{2x-5x^2}$ (*b*) $\lim_{x\to-\infty}\frac{5x-3}{2x^2+7x-1}$

Find each derivative.

19) $y=-14e^{2x}$ 20) $f(x)=-2x^2e^{-3x}$

21) $y=\frac{\ln(2x+6)}{x+3},\ x>-3$ 22) $y=(x^3+e^{2x})^3$

23) $f(x)=\frac{e^x(x^2+2)}{\ln x}$

24) Find the slope of the tangent line and the equation of the tangent line to the curve $y=xe^x$ at the point where $x=1$.

25) Find any open intervals where these functions are increasing.

(*a*) $f(x)=4x^3+8x^2-16x+11$ (*b*) $g(x)=\frac{15}{2x+7}$

Find the locations and values of all relative maxima and minima.

26) $f(x)=2x^3+3x^2-12x+5$ 27) $g(x)=\frac{\ln x}{2x^2},\ x>0$

Find the second derivative of each function.

28) $f(x)=9x^3+\frac{2}{x}$ 29) $g(x)=\frac{1-2x}{4x+3}$

30) Find $f''(2)$ and $f''(5)$ if $f(x)=2x^2-5x^3+\frac{1}{x^2}$

Sketch a graph of each function using algebra and calculus information.

31) $f(x)=4x+\frac{1}{x}$ 32) $y=\frac{4x^2}{x^2+4}$