

Final Exam

Tuesday, July 43, 2038

MATH 151.01

21:70 – 23:70

Founders 4004

Instructions: Show all work. Failure to show work may result in loss of credit. Write your solutions in the space provided on the *answer sheets*. Do *not* hand in scratch paper. You may use your graphing calculators for *all questions*, but decimal approximations are acceptable only in *Question 7*. A one-page list of relevant formulae is also allowed. Please remember to circle your final answers. Some partial credit *may* be given. **Good Luck!**

- 1) Find the exact value of $\tan\left(-3 \sin^{-1}(112/113)\right)$.
- 2) Find $\lim_{x \rightarrow \infty} \left(\sqrt{x^4 - 5x^2 + 8} - x(x+3)\right)$.
- 3) A particle moves along a horizontal line so that its coordinate at time t is given by $x = e^{-2t} \sin t$. Find the velocity and acceleration functions.
- 4) Differentiate the function $y = (5 + 2 \cos x)^{x+4}$.
- 5) Find an equation of the tangent line to the curve $1 + \sin y = x + 4y$ at the point $(1, 0)$.
- 6) Show that the function $y = e^{-2t} \cos t$ satisfies the differential equation $y'' + 4y' + 5y = 0$.
- 7) Find all minima and maxima of the function $g(x) = \frac{x+6}{2x^2 - 2x + 1}$.
- 8) A curve passes through the point $(1, 1)$ and has the property that the slope of the curve at every point P is one third of the y -coordinate of P . What is the equation of the curve?
- 9) Sketch the graph of $g(x) = \frac{7x-10}{x^2-2}$. Use the guidelines in your book. Any conclusions based solely on graphing utilities or computers are not acceptable.
- 10) Show that the equation $x^5 - 3x^2 - 6x + 9 = 0$ has *exactly* three roots.
- 11) Find the most general antiderivative of the function $f(x) = e^{-5x} - x^{-7} - \sin 3x$.
- 12) Find g if $g''(x) = 27 \sin 3x + 30x^4 - 14$, $g'(0) = 4$, $g(0) = -3$.

Points: There are 12 questions; question $\#n$ is worth $\frac{50 - 2 \cos(2n\pi/3)}{3}$ points.

You are welcome to keep this *Questions sheet* for your files.