Vantage MATH 101 Jeopardy!

Before the Midterm	Power Series	Approximations	Taylor Series	Differential Equations
$100	$100	$100	$100	$100
$200	$200	$200	$200	$200
$300	$300	$300	$300	$300
$400	$400	$400	$400	$400

Final Jeopardy

Before the Midterm - $100

- The Fundamental Theorem of Calculus requires that a function be _____ on an interval.

- What is **continuous**?

Before the Midterm- $200

- In order to define the integral of f(x) from a to b, we need f(x) to be _____ on [a,b].

- What is **defined?**

Before the Midterm- $300

- $\int_2^3 x\sqrt{x+1}\,dx$ can be computed using these two integration techniques

- What are integration by parts (Take $\mathrm{dv} = \sqrt{x+1}\,dx\ and\ u = x$) and u-substitution (u=x+1)?

Before the Midterm- $400

- T/F: The volume of the solid generated by rotating sin(x) between x=0 and x=pi/2 around the y-axis can be easily computed using the slice/disk method.

- False! If we set up the integral, we get an integral in terms of arcsin(x), which is something we do not know how to compute. Using cylindrical shells gives a much better integral

Power Series- $100

- The interval of convergence of $\sum_{n\geq 0} \frac{(x+3)^n}{2^{2n}}$ is _____.

- What is (-7,1)?

Power Series - $200

- A power series centered at $x = 1$ can never converge only on $(1, \infty)$ because power series must converge at _____, _____, or _____.

- What is **the center $x = 1$**, **a symmetric interval around 1**, and **everywhere**.

Power Series- $300

- This is the power series representation for $x\log(x+3)$

- What is $log(3)x + \sum_{n\geq 0} \frac{(-1)^n x^{n+2}}{3^{n+1}(n+1)}$

Power Series - $400

- The series $\sum_{n\geq 1} nx^n$ converges to this

- What is $\frac{x}{(1-x)^2}$

Approximations- $100

- The degree one approximation of log(1.05) gives log(1.05) to be approximately _____.

- What is 0.05**?**

Approximations - $200

- The the degree three approximation of $f(x) = x\tan(x)$ is _____.

- What is x^2?

Approximations- $300

- The error of the degree n approximation of f(x) at x = a is _____ where s is _____.

- What is $R_n(x) = \frac{f^{(n+1)}(s)}{(n+1)!}(x-a)^{n+1}$ where s is **between a and x.**

Approximations - $400

- For $f(x) = xe^{-x}$ and center c=0, the error of the degree 2 approximation is less than _____ for $x \in (0,1)$.

- What is $\frac{3x^3}{3!} < \frac{1}{2}$ for $x \in (0,1)$

Taylor Series - $100

- The Taylor series of f(x) at x = a is _____.

- What is $\sum_{n\geq 0} \frac{f^n(a)}{n!}(x-a)^n$

Taylor Series - $200

- The 101th derivative of $\arctan(x)$ at x = 0 is _____.

- What is 100! ?

Taylor Series - $300

- The power series representation of the antiderivative of $cos(x^3)$ is _____.

- $\sum_{n\geq 0} \frac{(-1)^n x^{6n+1}}{(2n)!(6n+1)}$ (up to a constant)

Taylor Series - $400

- The Taylor series of log(x) centered at x=2 is _____.

- $\log(2) + \sum_{n\geq 1} \frac{(-1)^n}{n2^n}(x-2)^n$

Differential Equations- $100

1. A differential equation of the form $\frac{dy}{dx} = p(y)q(x)$ is called _____.

- What is **Separable?**

Differential Equations- $200

- The differential equation $y' + \sin(x)y + 2y = 5x$ can be solved by taking _____ as the integrating factor

- What is $I = e^{\int \sin(x)+2\,dx} = e^{-\cos(x)+2x}$?

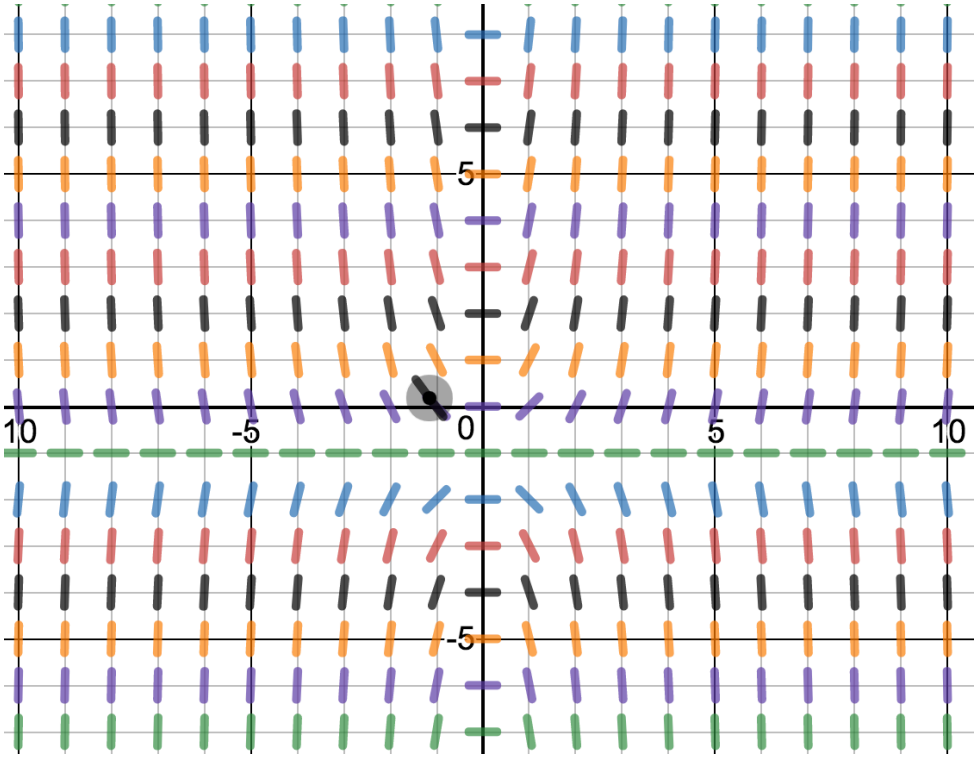
Differential Equations- $300

- Solutions to differential equations can be expressed quantitatively, by a curve, or qualitatively, using this concept.

- What are **direction fields?**

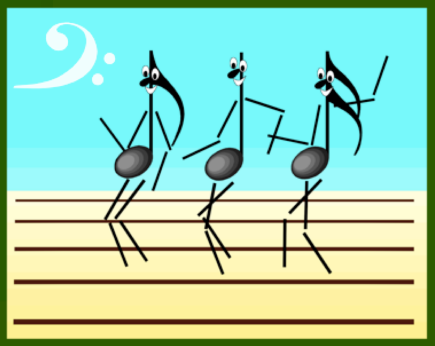
Differential Equations- $400

- The direction field pictured here is the field for this differential equation



- What is $\frac{dy}{dx} = x(y+1)$?

Final Jeopardy



- The names of your math101 instructors are….

Who are Wayne, Vanessa, Pam, Chan, Megan, Emily, and Kevin!

We congratulate you on completing the term!