C08: Work.

A 150 pound wrecking ball hanging from a 30 foot, 90 pound cable was hoisted up from a crane. Give a definite integral equal to the work required to pull up the ball and cable. (Do not solve your integral.)

C09: Param.

Parametrize the curve $y = x^2 + 3x + 2$ from $(-1, 0)$ to $(2, 12)$.

S08: ParamAppl.

Consider the curve defined by the parametric equations $x = t^3 - 4$, $y = 4t - t^2$, $t > 0$. Use the Chain Rule $\frac{dy}{dt} = \frac{dy}{dx}\frac{dx}{dt}$ to find the point with a horizontal tangent line.

C10: Polar.

Convert the Cartesian coordinates $(-4, -4)$ to polar.

S09: PolarAppl.

The arclength of the curve defined by the polar equation $r = r(\theta)$ where $\alpha \leq \theta \leq \beta$ is given by $\int_\alpha^\beta \sqrt{(r(\theta))^2 + (\frac{dr}{d\theta})^2}\, d\theta$. Give a definite integral equal to the circumference of the circle $(x-5)^2 + y^2 = 25$.

S10: SeqForm.

Find a formula for the sequence $\langle 0, 1, 3, 7, 15, 31, 63, \ldots \rangle$. (You may choose whatever starting index you like.)

C11: SeqLim.

Find $\displaystyle\lim_{m\to\infty} \frac{\sin(m)}{m!}$.

C12: PartSum.

Find a formula for the partial sum $s_n = a_0 + a_1 + \cdots + a_n$ where $a_n = (\frac{2n+9}{4n+3} - \frac{2n+11}{4n+7})$. Then use this formula to find the value of $\sum_{n=0}^\infty (\frac{2n+9}{4n+3} - \frac{2n+11}{4n+7})$.

S11: GeoAlt.

Let a_n be positive and monotonic (non-increasing or non-decreasing). Recall that the alternating series $\sum_{n=N}^\infty (-1)^{n+1} a_n$ converges if and only if $\lim_{n\to\infty} a_n = 0$.
Does the series $\sum_{k=1}^\infty (-1)^{k+1} \frac{3k}{5+4k} = \frac{3}{9} - \frac{6}{13} + \frac{9}{17} - \frac{12}{21} + \ldots$ converge or diverge?

S12: IntTest.

Does $\int_1^\infty \frac{3}{\sqrt{x}}\, dx$ converge or diverge?
Does $\sum_{m=4}^\infty \frac{3}{\sqrt{m}}$ converge or diverge?

S13: RatioRoot.

Recall that $e^x = \lim_{n\to\infty} (1 + x/n)^n$. Does $\displaystyle\sum_{k=2}^\infty \left(1 - \frac{1}{k}\right)^{k^2}$ converge or diverge?

S14: CompTests.

Does $\displaystyle\sum_{n=0}^\infty \frac{n+3}{n^2+7}$ converge or diverge?

C13: SerTech.

For each series, choose **one** technique that would be appropriate to determine convergence/divergence. (There may be multiple correct responses.) Then choose whether the series is convergent or divergent. You do not need to show your work.
Choices: *Partial Sum Sequence — Divergence Test — Geometric Series Test — Alternating Series Test — Integral Test — p-Series Test — Ratio Test — Root Test — Direct/Limit Comparison Test*

1. $\sum_{k=0}^\infty \frac{\sqrt{k^2+1}}{\sqrt{k^4+4-1}}$
2. $\sum_{m=3}^\infty \frac{m!}{\pi^m}$
3. $\sum_{n=2}^\infty (-1)^n \frac{2^n}{5^n}$

C14: PowSer.

Find the domain of $f(x) = \sum_{k=1}^{\infty} \frac{(3-x)^k}{(k^2+1)2^k}$. For each endpoint, if they exist, write the appropriate series and label it as converges/diverges, but you do not need to show your work in determining if the series converges or diverges.

C15: TaySer.

Generate the MacLaurin series (Taylor series where $a = 0$) for $f(x) = \frac{1}{e^x}$.

S15: PowSerConv.

Use the fact that $\frac{1}{1-x} = \sum_{k=0}^{\infty} x^k$ for $0 < x < 1$ to find a power series converging to $f(x) = \frac{1}{1-2x+x^2}$ for $0 < x < 1$. (Hint: What's the derivative of $\frac{1}{1-x}$?)

C16: Approx.

Recall that $e^x = \sum_{k=0}^{\infty} \frac{x^k}{k!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{6!} + \ldots$, and the Taylor polynomial error at x for $a = 0$ is given by $|R_n(x)| = \frac{|f^{(n+1)}(x_n)|}{(n+1)!}|x|^{n+1}$ for some value of x_n between 0 and x. First, find a sufficiently large value of n such that $|R_n(1/2)| < 0.01$. Then, approximate the value of $\sqrt{e}$ with an error no larger than 0.01.

Name:	
J#:	
Date: **2017 July 25**	

Exercise Type (Cost):

In-Class (1AP each)

Write the Standard code (C## or S##) for the exercise you are attempting:	Mark:
⋆ reattempt due on:	