Math 2320 - Final Exam Review

The final exam will include topics from Test 1 and Test 2.

1. **There will be an integral of each type** we have learned.
2. Prepare the entire Test 2 Review as it is **updated**.
3. Velocity, Acceleration and Position
   (a) Let $a(t) = -5\sin(t)$, $v(0) = 5$ and $s(0) = -7$.
      i. Find $v(t)$ and $s(t)$.
      ii. When does the object stop?
   (b) Let $a(t) = -12t$, $v(0) = 6$ and $s(0) = 0$.
      i. Find $v(t)$ and $s(t)$.
      ii. When does the object stop?
      iii. What is the position of the object when it stops?
4. Find the area between the functions
   (a) $y = x^2$ and $y = 4$.
   (b) $y = x^2$ and $y = x + 1$.
   (c) $y = e^{3x}$, $y = 4$ and the y-axis.
   (d) $x = y^2$ and $x = 4$.
   (e) $x = y^2$ and $y = x - 1$.
   (f) $y = \ln(x)$, $x = 1$ and $y = 4$.
   (g) $y = \ln(x)$, $x = 3$ and the x-axis.
5. Find the volume of the solid formed when rotating the region bounded by $y = x^2$ and $y = 4$ around the x-axis using discs.
6. Find the volume of the solid formed when rotating the region bounded by $y = x^2$ and $y = 4$ in the first quadrant around the y-axis using discs.
7. Find the volume of the solid formed when rotating the region bounded by $y = e^{3x}$, $y = 4$ and the y-axis around the x-axis using discs.
8. Rotate the region bounded by $y = 3x$, $y = 4$ and the y-axis around the y-axis using discs.

9. Rotate the region bounded by the ellipse $x^2 + \frac{y^2}{4} = 1$, $y = 2x - 2$ around the x-axis using discs.

   (a) Set up the integral with discs.

   (b) Compute the integral.

1 Taylor and Power Series

10. Find Taylor Series from definition.

    (a) $f(x) = \cos(2x)$ at $c = \pi/2$

    (b) $f(x) = \cos(2x)$ at $c = 0$

    (c) $f(x) = 3x^4 - x^2 - 1$ at $c = 2$

    (d) $f(x) = \frac{1}{1+2x}$ at $c = 2$

11. Find Taylor Series from known series. Inthis problem we will have $c = 0$.

    (a) $f(x) = \cos(2x)$.

    (b) $f(x) = \frac{1}{1+x^2}$.

    (c) $f(x) = \cos(x) - 1 - \frac{x^2}{2}$.

    (d) $f(x) = \frac{\cos(x)-1+\frac{x^2}{2}}{x^4}$.

    (e) $\lim_{x\to 0} \frac{\cos(x)-1+\frac{x^2}{2}}{x^4}$ Hint use Problem 11d.

    (f) $f(x) = \frac{x^2}{1-x^3}$.

    (g) $f(x) = \ln(1 - x^3)$

    (h) $f(x) = e^{ix}$ compare to your problem from class $\cos(x) + i\sin(x)$

12. Find Intrerval of convergence.

    (a) $f(x) = \sum \frac{1}{n^2} x^n$.

    (b) $f(x) = \sum \frac{1}{n} x^n$.

    (c) $f(x) = \sum \frac{2^n}{n} x^n$.

    (d) $f(x) = \sum \frac{n}{2^n} x^n$.

    (e) $f(x) = \sum \frac{1}{n!} x^n$.

    (f) $f(x) = \sum \frac{1}{n2^n} (x-1)^n$.

2 Conic Sections

13. Graph the following. Make certain to label important points as in class.

    (a) $\frac{x^2}{2} + \frac{y^2}{4} = 1.$

    (b) $\frac{x^2}{2} - \frac{y^2}{4} = 1.$

    (c) $-\frac{x^2}{2} + \frac{y^2}{4} = 1.$

    (d) $-\frac{x^2}{2} - \frac{y^2}{4} = 1.$

    (e) $-\frac{x^2}{2} - \frac{y}{4} = 1.$

    (f) $y = (x-1)^2.$

    (g) $x - 3 = (y-2)^2.$

    (h) $x^2 + \frac{y^2}{4} = 16.$

    (i) $\frac{(x-1)^2}{9} + \frac{(y+1)^2}{4} = 1.$

    (j) $\frac{(x-1)^2}{9} - \frac{(y+1)^2}{4} = 1.$