Math 132 - November 13, 2017 - Exam 3 review

Topics for Exam 3		
7.3 Trig Sub	7.4: Partial Fracs	7.5: Integration
7.8: Improper	8.1: Length	8.2: Area
11.1: Sequences	11.2: Geometric, Telescoping	11.3: Integral Test

1. $\int_3^\infty \frac{1}{(x-1)^3}\,dx =$
2. $\int_1^\infty \frac{1}{x}\,dx =$
3. $\int_1^\infty \frac{1}{\sqrt{x}}\,dx =$
4. $\int_1^\infty \frac{1}{x^{3/2}}\,dx =$
5. $\int_1^\infty \frac{1}{x^{1/4}}\,dx =$
6. $\int_0^5 \frac{1}{(x-2)}\,dx =$
7. $\int_1^2 \frac{3x+2}{x^2+x}\,dx =$
8. $\int_1^2 \frac{3x^2+3x+1}{x(x+1)^2}\,dx =$
9. $\int_0^{1/\sqrt{2}} \frac{x^2}{\sqrt{1-x^2}}\,dx =$
10. $\int_0^1 \frac{1}{\sqrt{1+x^2}}\,dx =$
11. $\int_0^1 \frac{4x^2+2x+4}{(x^2+1)^2}\,dx =$
12. Find $\int_7^8 \frac{1}{(8-x)^{1/3}}\,dx =$
13. $\int_1^\infty \frac{x^2}{(2+x^3)^2}\,dx =$
14. $\int_2^3 \frac{3x+3}{(x+2)(x-1)}\,dx =$
15. $\int_0^5 \frac{x^2}{x^2+25}\,dx =$
16. $\int_1^2 \frac{2x^2-3x+2}{x(x^2+1)}\,dx = A\arctan(2) + B\ln 2 + C\pi$. Find A, B, C
17. Find the form of partial fractions for $\frac{x+1}{x^4+x^2}$.
18. Find the length of $y = \frac{4}{3}x + \frac{5}{3}$ over $-1 \le x \le 2$.
19. A line segment with end points $(2,3)$ and $(6,0)$ is rotated about the y-axis. What is the surface area?
20. The graph of $y = 3\sqrt{x}$ for $4 \le x \le 10$ is rotated about the x-axis. What is the surface area?
21. Find partial fractions decomposition for $\frac{5x^2-5x-6}{x^3-2x^2-3x}$
22. $\int \frac{2x^3+3x^2+3x+1}{x^3+x}\,dx =$
23. $\int_2^4 \frac{dt}{t\sqrt{t^2-4}}\,dt =$
24. Find length of graph $y = (1/3)(x^2+2)^{3/2}$ over $0 \le x \le 3$.
25. Find surface area of $y = x + 1$ rotated about x axis over the interval $0 \le x \le 1$.
26. Find the integral that represents surface area of revolution of $y = e^x$ over $0 \le x \le 1$, rotated about the x axis.
27. Find the limit
    (a) $\lim_{n\to\infty} \frac{4n-3}{3n-4} =$
    (b) $\lim_{n\to\infty} \left(\frac{n+1}{2n}\right)\left(1 - \frac{1}{n}\right) =$

(c) $\lim_{n\to\infty} \frac{1}{(1/10)^n} =$

(d) $\lim_{n\to\infty} (\cos(1/n) + n\sin(1/n)) =$

(e) $\lim_{n\to\infty} n^2 e^{-5n} =$

(f) $\lim_{n\to\infty} \left(1 + \frac{4}{n}\right)^n =$

28. Find the sum, if possible

(a) $\frac{4}{9} + \frac{4}{27} + \frac{4}{81} + \frac{4}{243} + \cdots =$

(b) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{3}{n+1} - \frac{3}{n+2}\right) =$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{2^n + 3^n}{4^{n-1}} =$

(d) $3 + \frac{6}{5} + \frac{12}{25} + \frac{24}{125} + \frac{48}{625} + \cdots =$

(e) $\displaystyle\sum_{n=1}^{\infty} \frac{8}{3^n} =$

(f) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{2^n} - \frac{1}{4^{n-1}}\right) =$

(g) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{3^n} =$

(h) $\displaystyle\sum_{n=2}^{\infty} 3\left(\frac{-1}{2}\right)^n =$

(i) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{(n+1)^2} - \frac{1}{n^2}\right) =$

(j) $\displaystyle\sum_{n=1}^{\infty} (\cos(1/n) - \cos(1/(n+1))) =$

(k) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{n+2} - \frac{1}{n+7}\right) =$

29. Converge or diverge?

(a) $\displaystyle\sum_{n=2}^{\infty} \frac{\ln n}{n^2}$

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n \ln n}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{2n+1}{(n+1)^2}$

(d) $\displaystyle\sum_{n=1}^{\infty} \frac{n+2}{n^{3/2}}$

(e) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^{\pi}}$

(f) $\displaystyle\sum_{n=1}^{\infty} \sqrt[n]{15}$

(g) $\displaystyle\sum_{n=2}^{\infty} \frac{n^2}{n^3 - 1}$

30. If $a_n = n^2 e^{-5n}$, find $\lim_{n\to\infty} a_n$.

31. Find $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{2^n} - \frac{1}{4^{n-1}}\right)$

32. Find $\displaystyle\int \frac{x^3 - 3x^2 - 9}{x^3 - 3x^2}\, dx$

33. Find $\displaystyle\int_0^5 \frac{x^2}{\sqrt{25 - x^2}}\, dx$

34. Find $\displaystyle\int_{-2}^{1} \frac{1}{x^2 + 4x + 13}\, dx$

35. Find $\lim_{n\to\infty} \frac{n^4}{n!}$

36. Converge or diverge: $\displaystyle\int_0^{\infty} \frac{1}{x^2 + \sqrt{x}}\, dx$