5.5.5 $\lim_{x\to0} \frac{\sqrt{2x+4}-2}{x} = \lim_{x\to0} \frac{1}{2}(2x+4)^{-\frac{1}{2}}\cdot 2 = \lim_{x\to0} \frac{1}{\sqrt{2x+4}} = \underline{\frac{1}{2}}$

6. $\lim_{x\to0} \frac{3-\sqrt{2x+9}}{2x} = \lim_{x\to0} \frac{-\frac{1}{2}(2x+9)^{-\frac{1}{2}}\cdot 2}{2} = \frac{-1}{2\sqrt{2x+9}} = \underline{\frac{-1}{6}}$

18. $\lim_{x\to\infty} \frac{x^4}{e^x} = \lim_{x\to\infty} \frac{4x^3}{e^x} = \lim_{x\to\infty} \frac{12x^2}{e^x} = \lim_{x\to\infty} \frac{24x}{e^x} = \lim_{x\to\infty} \frac{24}{e^x} = \underline{0}$

$\lim_{x\to0} \frac{e^x-1}{\sin x} = \lim_{x\to0} \frac{e^x}{\cos x} = \underline{1}$

$\lim_{x\to\infty} (x-\sqrt{x^2-1}) = \lim_{x\to\infty} \left(x-\sqrt{x^2(1-\frac{1}{x^2})}\right) = \lim_{x\to\infty} \left(x\left(1-\sqrt{1-\frac{1}{x^2}}\right)\right)$

$= \lim_{x\to\infty} \frac{1-\sqrt{1-1/x^2}}{1/x} = +x^2\left(-\frac{1}{2}\left(1-\frac{1}{x^2}\right)^{-\frac{1}{2}}\cdot\frac{2}{x^3}\right) = \frac{1}{x\sqrt{1-1/x^2}} = \underline{0}$

41. $\lim_{x\to0} xe^x = \underline{0}$

$\lim_{x\to1} \frac{x^2+5}{x+1} = \frac{1+5}{1+1} = \underline{3}$

$\lim_{x\to\infty} \frac{\ln x}{x^p} = \lim_{x\to\infty} \frac{x^{-1}}{px^{p-1}} = \lim_{x\to\infty} \frac{1}{px^p} = 0 \quad (p>0)$

5.8.2. $f(x) = 1-3x^2 \Rightarrow \underline{F(x) = x-x^3+C}$

4. $f(x) = 2x-4x^3 \rightarrow \underline{F(x) = x^2-x^4+C}$

6. $f(x) = 2x^2+x-5 \rightarrow \underline{F(x) = \frac{2}{3}x^3+\frac{1}{2}x^2-5x+C}$

8. $f(x) = x-2x^2-3x^3-4x^4 \rightarrow \underline{F(x) = C+\frac{1}{2}x^2-\frac{2}{3}x^3-\frac{3}{4}x^4-\frac{4}{5}x^5}$

18. $f(x) = \frac{1}{3+x} \rightarrow \underline{F(x) = \ln(3+x)}$

20. $f(x) = e^{\frac{1}{2}x}+e^{-\frac{1}{2}x} \rightarrow \underline{F(x) = 2e^{x/2}-2e^{-x/2}}$

40. $\frac{dy}{dx} = e^{-2x}, \; x>0$

$y(x) = -\frac{1}{2}e^{-2x} + C, \; x>0$

41. $\frac{dy}{dt} = t(1-t) = t - t^2, \; t \geq 0$

$y(t) = \frac{1}{2}t^2 - \frac{t^3}{3} + C$

66. $\frac{dN}{dt} = 3\sin(2\pi t), \; N(0) = 10$

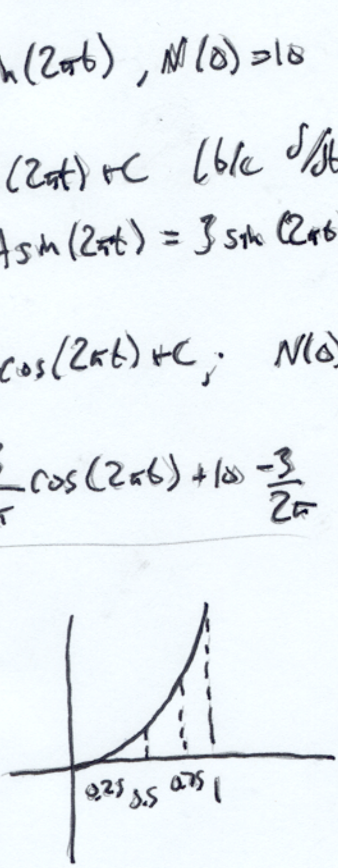
$N(t) = A\cos(2\pi t) + C$ (b/c $\frac{d}{dt}(\cos(2\pi t)) \propto \sin(2\pi t)$)

$\frac{dN}{dt} = -2\pi A \sin(2\pi t) = 3\sin(2\pi t) \rightarrow A = \frac{-3}{2\pi}$

$N(t) = \frac{-3}{2\pi}\cos(2\pi t) + C; \quad N(0) = \frac{-3}{2\pi} + C = 10 \rightarrow C = 10 - \frac{3}{2\pi}$

$N(t) = \frac{-3}{2\pi}\cos(2\pi t) + 10 - \frac{3}{2\pi}$

6.1.1



$A = \sum_{n=0}^{3} f(x_n)\Delta x_n, \; \Delta x_n = x_{n+1} - x_n = \frac{1}{4}$

$= \frac{1}{4}\left[f(0) + f(\tfrac{1}{4}) + f(\tfrac{1}{2}) + f(\tfrac{3}{4})\right]$

$= \frac{1}{4}\left(0 + \frac{1}{16} + \frac{1}{4} + \frac{9}{16}\right) = \frac{39}{224} \approx 0.174$

5. $\sum_{k=1}^{4} \sqrt{k} = \sqrt{1} + \sqrt{2} + \sqrt{3} + \sqrt{4}$

7. $\sum_{k=0}^{5} 2^k = 2^0 + 2^1 + 2^2 + 2^3 + 2^4 + 2^5$

10. $\sum_{k=0}^{4} k^k = 0 + 1^k + 2^k + 3^k + 4^k$

16. $\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} = \sum_{k=1}^{4} \frac{1}{\sqrt{k}}$

18. $\frac{3}{5} + \frac{4}{6} + \frac{5}{7} + \frac{6}{8} + \frac{7}{9} = \sum_{k=3}^{7} \frac{k}{k+2}$

20. $\frac{1}{1} + \frac{1}{2} + \frac{1}{4} + \cdots + \frac{1}{2^n} = \sum_{k=0}^{n} \frac{1}{2^k}$

22. $1 - a + a^2 - a^3 + \cdots + (-1)^n a^n = \sum_{k=0}^{n} (-1)^k a^k$

$$\sum_{k=1}^{10}(2\ k^2) \quad \sum_{k=1}^{10} 2 \quad \sum_{k=1}^{10} k^2 \quad 2(10) \quad \left(\frac{10(10+1)(20+1)}{6}\right) \quad \underline{365}$$

$$\sum_{k=1}^{n}(k+2)(k-2) \quad \sum_{k=1}^{n} k-4 \quad \sum_{k=1}^{n} k^2 \quad \sum_{k=1}^{n} 4 \quad \underline{\frac{n(n+1)(2n+1)}{6} \quad 4n}$$

$$\int_{-1} (1-x^2)\,dx$$

$$\sum_{k}^{4} f(x_k)\,\Delta x_k \quad \Delta x_k \quad \frac{-(-1)}{5} \quad \frac{2}{5}$$

$$-\frac{2}{5}\left[f(-1)+f(-1+2/5)+f(-1+4/5)+ \quad -1+6/5 \quad +f(-1+8/5)\right]$$

$$=\frac{2}{5}\left[0+0.64+0.96+0.96+0.64\right]=1.28$$

$$\int_{-2}^{-1}\frac{}{1-x}\,dx \quad \lim_{\|P_k\|\to 0}\sum_{k=1}^{n}\frac{c_k}{-c_k}\Delta x_k \quad \Delta x_k \quad x_k - x_{k-1}$$

P is a partition of $[-2, -1]$ w/ pts c_k

So. $\int_1^3 e^x\,dx = \lim_{\|P_k\|\to 0}\sum_{k=1}^{n} e^{-c_k}\Delta x_k$ (Same cond' as above)