1. E
2. C
3. A
4. D
5. C
6. C
7. C
8. B
9. A
10. C
11. D
12. E
13. A
14. E
15. B
16. C
17. A
18. C

19. D
20. D
21. B
22. E
23. B
24. D
25. D
26. D
27. E
28. D
76. E
77. A
78. C
79. D
80. A
81. A
82. A
83. E
84. C

85. A

86. C

87. C

88. C

89. D

90. B

91. B

92. C

5. $\frac{dy}{dx} = x + y$

$y_n = y_{curr} + \left(\frac{dy}{dx}\right)(\Delta x)$

$(1, 2)$ $y_n = 2 + 3(.5) =$

$(1.5, 3.5)$ $y_n = 3.5 + 5(.5) =$

$(2, 6)$

7.

$x = t^3 - 3t^2$

$\frac{dx}{dt} = 3t^2 - 6t = 0$

$3t(t-2) = 0$

$t = 0, 2$

$y = 2t^3 - 3t^2 - 12t$

$\frac{dy}{dt} = 6t^2 - 6t - 12 = 0$

$6(t^2 - t - 2) = 0$

$6(t-2)(t+1) = 0$

$t = 2, -1$

8.

$\int x^2 \cos(x^3)\, dx$

$u = x^3$

$du = 3x^2\, dx$

$\int x^2 \cos u \frac{du}{3x^2}$

$\frac{1}{3}\int \cos u\, du$

$\frac{1}{3}\sin x^3 + C$

10.

$$\sum_{n=1}^{\infty} \frac{2^{n+1}}{3^n}$$

$$\frac{2^n \cdot 2^1}{3^n}$$

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

$$2\left(\frac{\frac{2}{3}}{1-\frac{2}{3}}\right) = 2(2) = 4$$

15.

$$\text{Arc Length} = \int_1^4 \sqrt{1+9x^4}$$

$$= \sqrt{1+\left(\frac{dy}{dx}\right)^2}$$

$$\int \frac{dy}{dx} = \int 3x^2 \cdot dx \qquad (1,6)$$

$$y = x^3 + C$$

17. $x = t^2 - 4t + 1 \quad y = t^3 = 8 \quad (-3, 8)$

$t = 2$

$$\frac{dy}{dx} = \frac{3t^2}{2t-4}\Big|_{t=2} = \text{und.}$$

$x = -3$

18. $$g(x) = \int_0^{2x} f(t)\,dt$$

$$g'(x) = f(2x) \cdot 2$$

$$g'(3) = f(6) \cdot 2$$

$$= -1 \cdot 2 = -2$$

19.

$$\frac{dy}{dx} = 2x + 3 \qquad (1,2)$$

$$y = x^2 + 3x + C$$

20.

$$\frac{x^4}{2!} + \frac{x^5}{3!} + \frac{x^6}{4!} + \cdots$$

$$x^2\left(1 + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots\right)$$

22. $\sum_{n=1}^{\infty} \frac{n}{n^p+1}$

$\frac{n}{n^p}$

$\frac{1}{n^{p-1}}$ $p-1>1$

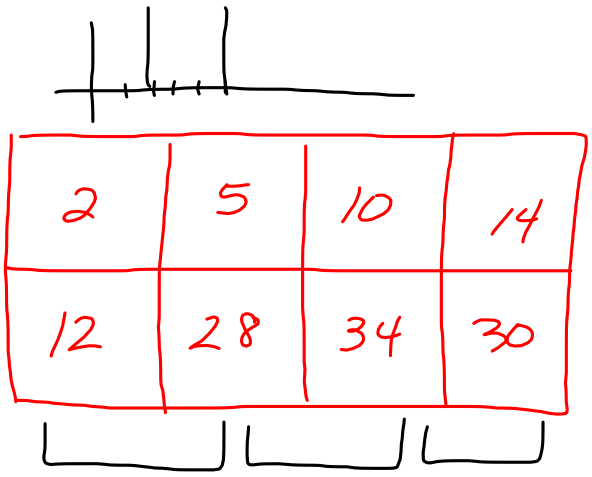
$p>2$

24. C. $\sum_{n=0}^{\infty} \left(\frac{\sin 2}{\pi}\right)^n$ $\frac{\sin 2}{\pi}<1$

D $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n}} = \frac{1}{n^{\frac{1}{3}}}$ $p=\frac{1}{3}<1$

D. $\sum_{n=1}^{\infty} \left(\frac{e^n}{e^n+1}\right)$

25.




$$3(28) + 5(34) + 4(30)$$
$$84 + 170 + 120$$

26.

$$\int \frac{2x}{(x+1)(x+2)}\,dx$$

$$\frac{2x}{(x+1)(x+2)} = \frac{A(x+2)}{(x+1)} + \frac{B(x+1)}{(x+2)}$$

$x = -2$ $\quad -4 = -B$

$B = 4$

$x = -1$ $\quad -2 = A$

$$\int \frac{-2}{x+1} + \frac{4}{x+2}\,dx$$

$$-2\ln|x+1|$$

27. $\frac{d}{dx}\left(\int_0^{x^3} \ln(t^2+1)\,dt\right)$

$3x^2 \ln(x^6+1)$

28. $\frac{1}{(1+x)^2}$ $x=0$

$(1+x)^{-2}$

$f' = -2(1+x)^{-3}$

$f'' = 6(1+x)^{-4}$

$f''' =$

$f(0)$ $f'(0)$

$\frac{1}{1} + \frac{-2x}{1!} + \frac{6x^2}{2!}$

4.

$$\frac{\frac{dy}{dt}}{\frac{dx}{dt}} = \frac{4\cos t}{-3\sin t} = -\frac{4}{3}\cot t$$

$$-\frac{4}{3}\cdot\frac{1}{\tan t}$$

5.

$$\frac{dy}{dx} = x + y$$

$$y_{new} = y_{curr.} + \frac{dy}{dx}(\Delta x)$$

$(1, 2)$ $y_n = 2 + (3)(.5) = 3.5$

$(1.5, 3.5)$ $y_n = 3.5 + 5(.5) = 6$

$(2, 6)$

6.

$$\frac{1}{x^{2p}}$$

$$2p > 1$$

$$p > \frac{1}{2}$$

9.

$$f(x) = \ln(x + 4 + e^{-3x})$$

$$f'(0) = \frac{1}{x + 4 + e^{-3x}} \cdot 1 - 3e^{-3x} \Big|_{x=0}$$

$$= \frac{-2}{5}$$

10. $\sum_{n=1}^{\infty} \frac{2^{n+1}}{3^n}$

$\frac{2^n \cdot 2^1}{3^n}$

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

$2\left(\frac{\frac{2}{3}}{1-\frac{2}{3}}\right) = 2\left(\frac{\frac{2}{3}}{\frac{1}{3}}\right)$

11. $\frac{1}{1-x}$

$1 + x + x^2 + x^3 + x^4 + \cdots$

$\frac{x^2}{1-x^2}$ $a_1 = x^2$ $r = x^2$

$x^2 + x^4 + x^6 + x^8 + x^{10} + \cdots$

15. $\int_1^4 \sqrt{1+9x^4}\,dx$

$\int \sqrt{1+\left(\frac{dy}{dx}\right)^2}$

$\frac{dy}{dx} = 3x^2$ (1, 6)

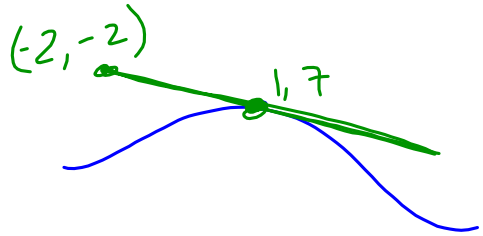
$\int 3$

$y = x + C$

$6 = 1 + C$

$C = 5$

16. find slope




$f'(1)$

$-3 < \begin{matrix} 1, 7 \\ -2, -2 \end{matrix} > -9$

$m = \frac{-9}{-3} = 3$

17. $(-3, 8)$

$(x, y)$ $t = 2$

$x = t^2 - 4t + 1 = -3$ $y = t^3 = 8$

$$\frac{dy}{dx} = \frac{3t^2}{2t-4}\Big|_{t=2}$$

18.

$$g(x) = \int_0^{2x} f(t)\,dt$$

$$g'(x) = f(2x) \cdot 2$$

$$g'(3) = f(2 \cdot 3) \cdot 2$$

$$f(6) \cdot 2$$

$$-1 \cdot 2 = -2$$

19. $\frac{dy}{dx} = 2x+3 \qquad (1,2)$

$y = x^2 + 3x + C$ (2, 1, (1))

$y = 2 + \int_1^x 2t+3 \, dt$

$2 + \left( t^2 + 3t \Big|_1^x \right.$

$2 + x^2 + 3x - (1+3)$

$x^2 + 3x - 2$

21.

$\frac{dM}{dt} = .6M\left(1 - \frac{M}{200}\right)$

$= .6M \frac{1}{200}(200 - M)$

$\frac{dP}{dt} = kP(M_{ax} - P)$

22.

$$\sum_{n=1}^{\infty} \frac{n}{n^p + 1}$$

$$\frac{n}{n^p} = \frac{1}{n^{p-1}}$$

$p - 1 > 1$

$p > 2$

25.

| | | | |
|---|---|---|---|
| 2 | 5 | 10 | 14 |
| 12 | 28 | 34 | 30 |

$3(28) + 5(34) + 4(30)$

26.

$$\int \frac{2x}{(x+2)(x+1)}\,dx$$

$$\frac{2x}{(x+2)(x+1)} = \frac{A(x+1)}{(x+2)} + \frac{B(x+2)}{(x+1)}$$

$$2x = A(x+1) + B(x+2)$$

$x = -1$ $\quad -2 = B(-1+2)$

$-2 = B$

$x = -2$

$-4 = -1A$

$A = 4$

$$\int \frac{4}{x+2} + \frac{-2}{x+1}\,dx$$

$$4\ln|x+2| - 2\ln|x+1| + C$$

$$\ln\left(\frac{(x+2)^4}{(x+1)^2}\right) + C$$

27.

$$\frac{d}{dx}\left(\int_0^{x^3} \ln(t^2+1)\,dt\right)$$

$$\ln((x^3)^2+1)\cdot 3x^2$$

$$3x^2\ln(x^6+1)$$

28. $x^2$

$$\frac{1}{(1+x)^2} = (1+x)^{-2}$$

$$1 + \frac{-2x^1}{1!} + \frac{6x^2}{2!}$$

$f(0) = 1$

$f'(0) = -2(1+x)^{-3}$

$f''(0) = 6(1+x)^{-4}$

$$\frac{\frac{dy}{dt}}{\frac{dx}{dt}} = (2t+1)\left(\frac{dx}{dt}\right)$$