

1.3. 10

3MS

$$a) \int_1^4 (x^2 - 2x + 3) dx = \left. \frac{1}{3}x^3 - x^2 + 3x \right|_1^4$$

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

$$= \frac{64}{3} - 16 + 12 - \frac{1}{3} + 1 - 3$$

$$= \frac{63}{3} - 4 - 2 = 21 - 6 = 15$$

$$b) \int_{-1}^1 (2x^3 + 3x^2 + 2x - 1) dx =$$

$$\left. \frac{1}{2}x^4 + x^3 + x^2 - x \right|_{-1}^1 =$$

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

1.3.10

3MS

$$\frac{3}{2} - \left(\frac{3}{2}\right) = 0$$

$$c) \int_{-1}^1 \sqrt[3]{x+1} \, dx = \int_{-1}^1 (x+1)^{1/3} \cdot \underbrace{1}_{1} \cdot dx$$

$$= \frac{1}{1/3+1} (x+1)^{1/3+1} \bigg|_{-1}^1$$

$$= \frac{3}{4} (x+1)^{4/3} \bigg|_{-1}^1 = \frac{3}{4} (1+1)^{4/3} - \underbrace{\frac{3}{4} (-1+1)^{4/3}}_0$$

$$= \frac{3}{4} 2^{4/3} = \frac{3}{4} \sqrt[3]{2^4} = \frac{3}{4} \sqrt[3]{2^3 \cdot 2}$$

$$= \frac{3}{4} \sqrt[3]{2^3} \cdot \sqrt[3]{2} = \frac{3}{4} \cdot 2 \cdot \sqrt[3]{2} = \frac{3}{2} \sqrt[3]{2}$$

1.3.10

3MS

$$d) \int_{\pi/4}^{3\pi/4} \sin x \, dx = -\cos x \Big|_{\pi/4}^{3\pi/4} =$$

$$-\left(\cos \frac{3\pi}{4} - \cos \frac{\pi}{4}\right) = -\left(-\frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2}\right) = \sqrt{2}$$

$$e) \tan x \Big|_0^{\pi/4} = \tan \frac{\pi}{4} - \tan 0 = 1$$

$$f) \int_0^2 (1+2x)^3 \cdot \underbrace{2 \cdot \frac{1}{2}}_{()'} dx = \frac{1}{2} \int_0^2 (1+2x)^3 \cdot 2 \, dx$$

$$= \frac{1}{2} \int_0^2 (1+2x)^3 \cdot (1+2x)' \, dx = \frac{1}{2} \cdot \frac{1}{4} (1+2x)^4 \Big|_0^2$$

$$= \frac{1}{8} \left((1+4)^4 - 1^4 \right) = \frac{1}{8} (625 - 1) = 78$$

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$$g) \int_1^4 \frac{dx}{\sqrt{x}} = \int_1^4 x^{-1/2} dx$$
$$= \frac{1}{-1/2+1} x^{-1/2+1} \Big|_1^4 = 2 x^{1/2} \Big|_1^4$$

$$= 2(4^{1/2} - 1^{1/2}) = 2(\sqrt{4} - \sqrt{1})$$

$$= 2 \cdot (2 - 1) = 2$$

$$h) \int_0^{\pi/2} \sin^2(x) \cos x dx = \int_0^{\pi/2} (\sin x)^2 \cdot (\sin x)' dx$$

$$= \frac{1}{3} (\sin x)^3 \Big|_0^{\pi/2} = \frac{1}{3} \left(\left(\sin \frac{\pi}{2} \right)^3 - \underbrace{\left(\sin 0 \right)^3}_0 \right)$$

$$= \frac{1}{3} 1^3 = \frac{1}{3}$$