**Test about the differentials**

**Part I** Calculate the given differentials and mark the correct answer!

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1.** | $$d(sinx)$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$(cosx)'dx$$ | **B** | $$cosx$$ | **C** | $$cosx dx$$ | **D** | $$sin2x dx$$ |
| **2.** | $$d(4x^{3}-8x)$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$3∙4\left(x^{2}-8\right) dx$$ | **B** | $$\left(12x^{2}-8\right) dx$$ | **C** | $$\left(x^{4}-8\right) dx$$ | **D** | $$4(3x^{2}-2)dx$$ |
| **3.** | $$d(5^{x})$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$5^{x}ln5 dx$$ | **B** | $$x5^{x-1} dx$$ | **C** | $$\frac{5^{x}}{5} dx$$ | **D** | $$5 dx$$ |
| **4.** | $$d(cos3x)$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$3cosx dx$$ | **B** | $$-3sinx dx$$ | **C** | $$-sin3x dx$$ | **D** | $$-3sin3x dx$$ |
| **5.** | $$d(artctanx)$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$\frac{dx}{1+x^{2}}$$ | **B** | $$\frac{1}{cos^{2}x}dx$$ | **C** | $$\frac{1}{1+x}dx$$ | **D** | $$\frac{dx}{1+cosx^{2}}$$ |

**Part II** Convert the given expression into the differential of a function. Mark the correct answer!

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1.** | $$\frac{12}{\sqrt{1-x^{2}}}dx$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$d\left(\sqrt{1-x^{2}}\right)$$ | **B** | $$d\left(24\sqrt{1+x^{2}}\right)$$ | **C** | $$12d\left(arcsinx\right)$$ | **D** | $$d\left(\frac{arcsinx}{12}\right)$$ |
| **2.** | $$16x^{3}dx$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$d\left(4x^{4}\right)$$ | **B** | $$16d\left(x^{3}\right)$$ | **C** | $$d\left(48x^{2}\right)$$ | **D** | $$d\left(8x^{4}\right)$$ |
| **3.** | $$\frac{21 dx}{cos^{2}7x}$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$21d\left(tanx\right)$$ | **B** | $$d\left(3tan7x\right)$$ | **C** | $$3d\left(tan^{2}7x\right)$$ | **D** | $$d\left(\frac{7}{cos^{3}x}\right)$$ |
| **4.** | $$\frac{dx}{\sqrt{x}}$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$d\left(2\sqrt{x}\right)$$ | **B** | $$d\left(x^{1/2}\right)$$ | **C** | $$\frac{3}{2}d\left(\frac{1}{\sqrt{x^{3}}}\right)$$ | **D** | $$\frac{1}{2}d\left(x\right)$$ |
| **5.** | $$\frac{ln^{4}x}{x}dx$$ |  |  |  |  |  |  |  |  |
|  |  | **A** | $$d\left(\frac{ln^{5}x}{x}\right)$$ | **B** | $$d\left(4 lnx\right)$$ | **C** | $$d\left(5ln^{5}x\right)$$ | **D** | $$\frac{1}{5}d\left(ln^{5}x\right)$$ |

**Answers**

*Part I*

1 – C; 2 – B; 3 – A; 4 – D; 5 – A

*Part II*

1 – C; 2 – A; 3 – B; 4 – A; 5 – D

**Solution**

*Part I*  Apply the formula $dy=y' dx if y=y(x)$

Example 1

$$d(sinx)=(sinx)'dx=cosx dx$$

Example 2

$$d(4x^{3}-8x)=(4x^{3}-8x)'dx=(12x^{2}-8) dx$$

Example 3

$$d(5^{x})=(5^{x})'dx=5^{x}ln5dx$$

Example 4

$$d(cos3x)=(cos3x)'dx=-sin3x∙3 dx=-3sin3x dx$$

Example 5

$$d(arctanx)=(arctanx)'dx=\frac{1}{1+x^{2}}dx$$

*Part II* Apply the formula $y' dx=dy if y=y(x)$

Example 1

$$\frac{12}{\sqrt{1-x^{2}}}dx=12(arcsinx)'dx=12 d(arcsinx)$$

Example 2

$$16x^{3}dx=4(4x^{3})dx=4(x^{4})' dx=d\left(4x^{4}\right)$$

Example 3

$$\frac{21 dx}{cos^{2}7x}=3(tan7x)'dx=d\left(3tan7x\right)$$

Example 4

$$\frac{dx}{\sqrt{x}}=\frac{2dx}{2\sqrt{x}}=2\left(\sqrt{x}\right)' dx=d\left(2\sqrt{x}\right)$$

Example 5

$$\frac{ln^{4}x}{x}dx=\frac{1}{5}∙\frac{5ln^{4}x}{x}dx=\frac{1}{5}\left(ln^{5}x\right)'dx=\frac{1}{5}d\left(ln^{5}x\right)$$