



1. Suppose
- $g : \mathbf{U} \rightarrow \mathbf{U}$
- with

$$g(x) = \tan(x)$$

determine expression/s equivalent to

$$\frac{g(x+h) - g(x)}{h}$$

☐ A  $\frac{\sin(h)}{h \cos(h) \cos(x)^2 - h \cos(x) \sin(h) \sin(x)}$

☐ B  $-\frac{2(8 \cos(h)^4 - 8 \cos(h)^2 + 2(2 \cos(h)^3 - \cos(h)) \sin(h) + 1) \cos(x) + (8 \cos(h)^4 - 8 \cos(h)^2 - 8(2 \cos(h)^3 - \cos(h)) \sin(h) + 1) \sin(x)}{4(2 h \cos(h)^3 - h \cos(h)) \sin(h) \sin(x) - (8 h \cos(h)^4 - 8 h \cos(h)^2 + h) \cos(x)}$

☐ C  $-\frac{2(\cos(h) \sin(h) + 2 \sin(h)^2 - 1) \cos(x) + (4 \cos(h) \sin(h) - 2 \sin(h)^2 + 1) \sin(x)}{2 h \cos(h) \sin(h) \sin(x) - (2 h \cos(h)^2 - h) \cos(x)}$

2. Suppose
- $p : \mathbf{U} \rightarrow \mathbf{U}$
- with

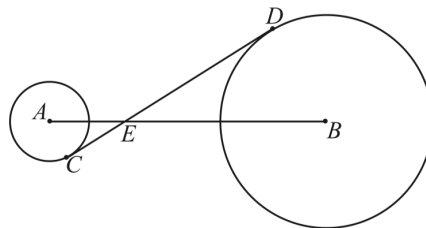
$$p(x) = 2x + 4$$

determine expressions equivalent to

$$p(y - 4)$$

☐ A  $2y - 12$  ☐ B  $2y + 2$  ☐ C  $2y - 4$

3. Circles with centers A and B have radii 3 and 15, respectively. A common internal tangent touches the circles at C and D, as shown. Lines AB and CD intersect at E, and AE=7. What is CD?



☐ A 12 ☐ B  $12\sqrt{10}$  ☐ C 28 ☐ D 42 ☐ E none of these

4. Suppose
- $p : \mathbf{U} \rightarrow \mathbf{U}$
- with

$$p(x) = \sin(x)$$

determine expression/s equivalent to

$$\frac{p(x) - p(c)}{x - c}$$

☐ A  $-\frac{\sin(c) - \sin(x)}{c + x}$

☐ B  $\frac{\sin(c) - \sin(x)}{c - x}$

☐ C  $-\frac{\sin(c) - \sin(x)}{c}$

5. The ratio

$$\frac{9^{8000} + 9^{8002}}{9^{8001} + 9^{8001}}$$

is closest to which of the following numbers?

☐ A  $\frac{41}{9}$  ☐ B  $\frac{82}{27}$  ☐ C  $\frac{82}{31}$  ☐ D  $\frac{82}{45}$  ☐ E  $\frac{82}{43}$   
☐ F  $\frac{41}{18}$  ☐ G 41 ☐ H  $\frac{82}{81}$  ☐ I none of these

6. Suppose
- $q : \mathbf{U} \rightarrow \mathbf{U}$
- with

$$q(x) = 4x^2 - 5x$$

determine expressions equivalent to

$$q(\psi + u)$$

☐ A  $4(\psi + u + 5)^2 - 5\psi - 5u - 25$

☐ B  $4(\psi + u + 1)^2 - 5\psi - 5u - 5$

☐ C  $4(\psi + u)^2 - 5\psi - 5u$

7. Suppose  $f(x) = \frac{1}{x^3}$  determine if

$$f(-3\kappa) = -3f(\kappa)$$

☐ A True ☐ B False

8. Select equivalent expressions AND solve.

$$x + \frac{x-3}{x-4} + \frac{1}{x+3} - \frac{3}{x-4} - 3 = \frac{x^2 - 6x + 9}{x-4}$$

☐ A  $[x = -\frac{1}{2}\sqrt{5} + \frac{3}{2}, x = \frac{1}{2}\sqrt{5} + \frac{3}{2}]$

☐ B  $[x = (-\frac{13}{2})]$

☐ C  $[x = -\frac{3}{2}i\sqrt{3} + \frac{1}{2}, x = \frac{3}{2}i\sqrt{3} + \frac{1}{2}]$

☐ D none of these

9.

$$(x+1)^2 + 24(x+1)x$$

match the expression and its factored version

☐ A  $12(x+2)(x+1)$

☐ B  $(25x+1)(x+1)$

☐ C  $(5x-14)(x+2)$

10. solve the following inequality

$$7(x+7) > 5 + \frac{6+10x}{8}$$

☐ A  $x \geq (-\frac{193}{23})$

☐ B  $x > (-\frac{173}{23})$

11. Solve:  $(4x+1)(2x+1)(2x-1)(2x-2) = 0$

☐ A  $x = (\frac{2}{3})$  OR  $x = (-\frac{1}{2})$  OR  $x = (-\frac{2}{3})$  OR  $x = (-\frac{5}{3})$

☐ B  $x = (\frac{3}{2})$  OR  $x = 0$  OR  $x = (-\frac{1}{2})$  OR  $x = (\frac{3}{2})$

☐ C  $x = (-\frac{1}{2})$  OR  $x = (\frac{1}{2})$  OR  $x = 1$  OR  $x = (-\frac{1}{4})$

☐ D none of these

12. divide and simplify  $(6x^3 + 9x^2 + 12x + 7) \div (-3x - 3)$

☐ A  $(-2x^2 - x - 3) + \frac{2}{3(x+1)}$

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

☐ C  $(3x^2 + x + 1) - \frac{2x-1}{2(x^2-x)}$

☐ D none of these