

Nov 9, 2018

HW: Calculus

Solutions

$$1. \quad u_{40} = u_1 + (40-1)d = 106$$

$$S_{40} = \frac{40}{2} (u_1 + u_{40}) = 1900$$

$$u_1 + 106 = \cancel{388} \quad \downarrow \div 20$$

$$u_1 = \cancel{272} - 11$$

$$-11 \quad \cancel{272} + (39)d = 106$$

$$d = 3$$

$$-11, 3$$

$$2. (a) f'(x) = -\sin 2x \quad (2) = -2 \sin 2x$$

$$(b) g'(x) = \cancel{x} \frac{1}{3x-5} \quad (3) = \frac{3}{3x-5}$$

$$(c) h'(x) = f'(x) \cancel{g(x)} + g'(x) \cancel{f(x)} \\ = (-2 \sin 2x) [\ln(3x-5)] + \frac{3}{3x-5} (\cos 2x)$$

$$3. \quad f(1) = p(1^2) + q(1) = 3 \\ p + q = 3 \quad (a)$$

$$f'(x) = 2px + q$$

$$f'(1) = 2p(1) + q = 8 \quad (b)$$

$$p = 5$$

$$q = -2$$

$$(b) - (a)$$

Check  $f(x) = 5x^2 - 2x$  ✓  
 $f(1) = 3$   $f'(1) = 8$  ✓

BECA / HUSON / IB Math 12.1

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4.  $A = l \cdot w = 525$      $AB = l$   
 $w = 525/l$

$$\text{Cost} = 11 \cdot l + 3 \left( l + 2 \times \frac{525}{l} \right)$$
$$= 14l + \frac{\cancel{1050} 3150}{l}$$

$$\frac{d\text{Cost}}{dl} = 14 + - \frac{\cancel{1050} 3150}{l^2} = 0 \quad \text{take derivative at minimum}$$

$$14l^2 = \cancel{1050} 3150$$
$$l = \frac{\sqrt{75}}{1} = 5\sqrt{3}$$
$$\approx 8.66 \text{ m}$$

$$l = \sqrt{225}$$
$$= 15 \text{ m} \quad (\text{positive})$$

$$w = \frac{525}{15} = 35$$

$$\text{Cost} = 11 \cdot (15) + 3(15 + 2 \cdot 35)$$
$$= \$420$$

