

Answers to Exam 4

1. (12 pts.)

(a) $\int_1^4 x \ln x dx$

(b) $\left(\frac{3}{50}\right) \sum_{i=1}^{50} \left(1 + \frac{3i}{50}\right) \ln \left(1 + \frac{3i}{50}\right) = 7.5071261$ (Note: I would ask your class to find this for $n \leq 8$; this class learned how to do this using the calculator.)

(c) This is an overestimate because the graph of $y = x \ln x$ is concave up on $[1, 4]$.

2. $f(x) = 6 \cos x - x$; $f'(x) = -6 \sin x - 1$; $x_0 = 1$; $x_1 = 1.370612$; $x_2 = 1.344811$; $x_3 = 1.344751$; $x_4 = 1.344751$

3. (a) 28

(b) -5

(c) -2

4. First, $a(t) = -9.8$ so that $v(t) = -9.8t + v_0$ but $v_0 = 0$ since the canister is dropped. Next, $s(t) = -4.9t^2 + s_0$ and $s_0 = 500$ since the cliff is 500 m above ground. Thus, $s(t) = -4.9t^2 + 500$. We need to know when the canister hits the ground, or when $s(t) = 0$. So, $-4.9t^2 + 500 = 0$ gives $t = \sqrt{500/4.9} = 10.1$. Since the velocity is $v(10.1) = -98.995 \text{ m/sec} < -100$, the canister will not explode.

5. (a) $g'(x) = \sqrt{1 + 2x}$

(b) $h'(x) = e^x \sin^3(e^x)$

6. (a) **TRUE**

(b) **FALSE**

(c) **TRUE**

(d) **TRUE**

(e) **FALSE**

7. (10 pts.) Find the limits, if they exist. DO NOT USE YOUR CALCULATOR.

(a) d.n.e.

(b) $-1/2$

8. (a) $1/2$

(b) $3e^2 - 2 \cos 2 - 1$

(c) $x^2/2 + x^6/3 + C$

9. (a) $21/2$ (b) $89/6$